



DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

PANCHAPALLI & NAMANDAHLLI BLACK GRANITE & GRANITIC GNEISS QUARRY OVER AN EXTENT OF 16.54.0 Ha

At

**Survey No.: 287 of Panchapalli Village & 19 of Namandahalli Village
Panchapalli & Namandahlli Village,
Palacode Taluk,
Dharmapuri District,
Tamil Nadu State**

By



**M/s. Tamil Nadu Minerals Limited
No. 31, Kamarajar Salai
Chepauk
Chennai – 600 005**

**(Project termed under Schedule of 1(a) Mining of Minor Minerals 'B1' category as per
EIA Notification 2006 and its Amendments**

EIA Consultant

HUBERT ENVIRO CARE SYSTEMS PRIVATE LIMITED, CHENNAI

APRIL 2023



ACKNOWLEDGEMENT

The following personnel are gratefully acknowledged for their fullest support in collection, compilation of needful data regarding the project and kind cooperation in fulfilling the report on Environmental Impact Assessment (EIA) report of **Panchapalli & Namandahalli Black Granite & Granitic Gneiss Quarry** over an extent of 16.54.0 Ha Survey No: 287 (Panchapalli Village) & 19 (Namandahalli Village), Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu State.

M/s Tamil Nadu Minerals Limited,

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M/s Hubert Enviro Care Systems Private Limited,

- 1) Dr. J R Moses (CEO)
- 2) Dr. Raj Kumar Samuel (Director – Technical)
- 3) Mr. Vamsee Krishna Navooru (Head Consultant)

Declaration by the Project Proponent

I, Dr. E Ganesan, Deputy Manager (ML) of M/s Tamil Nadu Minerals Limited, declaration/ undertaking that owing the contents (information and data) of the EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) for **the Panchapalli&Namandahalli Black Granite & Granitic Gneiss Quarry over an extent of 16.54.0 Ha Survey No: 287 (Panchapalli Village) & 19 (Namandahalli Village), Panchapalli & Namandahalli Village, Palacode Taluk , Dharmapuri District, Tamil Nadu State,”** and the information and content provided in the report are factually correct.

for Tamil Nadu Minerals Ltd,


Authorised signatory
Deputy Manager (ML)
TAMIN - Chennai



Declaration by the Head of the Accredited Consultant Organization

I, Dr.J.R. Moses, hereby, confirm that the below mentioned experts prepared the EIA/EMP for Panchapalli&Namandahalli Black Granite & Granitic Gneiss Quarry over an extent of 16.54.0 Ha Survey No: 287 (Panchapalli Village) &19 (Namandahalli Village), Panchapalli & Namandahalli Village, Palacode Taluk , Dharmapuri District, Tamil Nadu State.

I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature:

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Designation: Chief Executive Officer

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NABET Certificate No & Validity: NABET/EIA/2224/SA 0190 & valid upto 27.07.2024

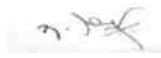



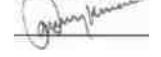

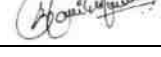



Declaration of Experts contributing to the EIA

I, hereby, certify that I was involved in the EIA report for the project titled Panchapalli&Namandahalli Black Granite & Granitic Gneiss Quarry over an extent of 16.54.0 Ha Survey no.287 (Panchapalli Village)&19(Namandahalli Village), Panchapalli&Namandahalli Village, Palacode Taluk , Dharmapuri District, Tamil Nadu State. I was a part of the EIA team in the following capacity that developed the above EIA with the support of the following Functional Area Experts.

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5.	EB FAE	Dr. Rajkumar Samuel		Jan 2023 to Till Date
6.	HG FAE	Mr. Mallikarjuna Rao		Jan 2023 to Till Date
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S. No.	Functional Areas		Name of the Expert	Signature	Duration of Involvement
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- WP - Water pollution monitoring, prevention and control*
SE - Socio-economics
EB - Ecology and biodiversity
LU - Land Use
AP - Air Pollution monitoring, prevention and control
AQ - Meteorology, air quality modeling and prediction
NV - Noise & Vibration
GEO - Geology
HG - Hydrology, ground water and water conservation
SC - Soil Conservation
SHW - Solid and hazardous waste management
RH - Risk assessment and hazards management

TABLE OF CONTENTS

1	INTRODUCTION OF THE PROJECT	19
1.1	Project Back Ground	19
1.2	Purpose and Status of the Report.....	19
1.3	Identification of Project & Project Proponent	20
1.3.1	Project	20
1.3.2	Project Proponent.....	20
1.4	Brief Description of the Project.....	20
1.4.1	Nature of the Project	20
1.4.2	Size of the Project	20
1.4.3	Location of the Project	21
1.4.4	Connectivity of the Project.....	22
1.5	Need for the project and its importance to the country and or region	22
1.6	EIA Study	22
1.7	EIA Cost	23
1.8	Scope of the Study	23
1.1	Objectives of the Study	24
1.2	Methodology adopted for the Study	25
1.3	Applicable Regulatory Framework	25
1.4	Legal Complicability	25
1.5	Terms of Reference Compliance	26
2	PROJECT DESCRIPTION	47
2.1	Type of project including interlinked and interdependent projects	47
2.2	Need for the Project.....	48
2.3	Quarry Location.....	48
2.4	Project Summary & Salient Features.....	57
2.4.1	Nearest Human Settlement.....	58
2.5	Details of alternate sites considered	58
2.6	Size or magnitude of operation.....	58
2.6.1	Black Granite Reserves	59
2.6.2	Granitic Gneiss Reserves	59
2.6.3	Depletion of Reserves	64
2.6.4	Additional reserves established category wise.....	64
2.7	Summary of the Magnitude of Operation.....	65
2.8	Project Cost	68
2.9	Technology & Process Description	68
2.9.1	Technology.....	68
2.9.2	Method of mining-Open Cast Working	69

2.9.3	Process Description.....	70
2.10	Requirements.....	73
2.10.1	2.10.1 Land Requirement and Land Use Planning.....	73
2.10.2	Water Requirement	74
2.10.3	Power Requirement.....	74
2.10.4	Fuel Requirement.....	74
2.10.5	List of Equipments.....	74
2.10.6	Man power Requirement.....	75
2.11	Solid Waste Management.....	75
2.12	Hazardous waste Management.....	75
2.13	Infrastructure facilities	75
2.14	Resource optimization/recycling and reuse envisaged in the project.....	75
2.15	Availability of water its source, Energy/power requirement and source	76
2.16	Schematic Representations of the Feasibility Drawing which Give Information Important for EIA Purpose	76
2.17	Description of Mitigation Measures Incorporated Into the Project to Meet the Environmental Standards.....	77
2.17.1	Land Environment.....	77
	Discharges on Land-Impact.....	78
2.17.2	Air Environment.....	78
2.17.3	Noise & Vibration Environment	80
2.17.4	Water Environment	82
2.17.5	Biological Environment	83
2.17.6	Solid Waste Management	83
2.18	Assessment of new and untested technology for the risk of technological failure.....	84
3	DESCRIPTION OF ENVIRONMENT.....	85
3.1	Preamble.....	85
3.2	Study Area.....	85
3.3	Description of the Study Area	85
3.4	Environmentally/Ecologically Sensitive areas	89
3.5	Physical Conditions of PIA district	92
3.5.1	PIA District Profile	92
3.5.2	Climatic Conditions	92
3.5.3	Natural Resources of PIA District.....	93
3.5.4	Land Use & Land Cover	96
3.5.5	Topography	102
3.5.6	Geomorphology of PIA District.....	105
3.5.7	Hydrogeology of PIA DistrictProfile	109
3.5.8	Drainage Pattern in PIA District	110
3.5.9	Geology.....	112

3.5.10 Seismicity	113
3.5.11 Soils in PIA District	114
3.5.12 Natural Hazards in PIA District	116
3.6 Establishment of Baseline for valued environmental components	117
3.6.1 Air Environment.....	117
3.6.2 Meteorological Conditions.....	117
3.6.3 Meteorological Data Collection	117
3.6.4 General Meteorological Scenario based on IMD Data	117
3.6.5 3.6.5 Meteorological data during Study Period.....	119
3.7 Ambient Air Quality	120
3.7.1 Ambient Air Quality Monitoring Stations	120
3.7.2 Ambient Air Quality Monitoring Techniques and Frequency	123
3.7.3	123
3.7.4 Results and Discussions	123
3.7.5 Observations.....	128
3.8 Noise Environment.....	128
3.8.1 Results and Discussions	128
3.8.2 Observations.....	129
3.9 Water Environment	132
3.9.1 Surface Water Quality Assessment	132
3.9.2 Surface Water Resources	132
3.9.3 Results and Discussions	137
3.10 Ground Water Resources	137
3.10.1 Groundwater Quality.....	139
3.10.2 Results and Discussions	144
3.11 Soil as a resource and its Quality	144
3.11.1 Results and Discussions	148
3.12 BIOLOGICALENVIRONMENT	148
3.12.1 Methodology	148
3.12.2 Floral Study.....	149
3.12.3 Faunal Study.....	149
3.12.4 Floristic composition within the study area	149
3.12.5 Terrestrial Fauna of the Study Area	152
3.12.6 Butterfly Species	155
3.12.7 Conservation Plan for Indian Peafowl (Peacock)	157
3.13 Socio Economic profile.....	160
3.13.1 Socio Economic Aspects.....	160
3.13.2 Social Economic Profile of the study area	162
3.13.3 Summary	173

4	ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES.....	176
4.1	Land Environment.....	176
4.1.1	Land Degradation.....	176
4.1.2	Mitigation Measures.....	177
4.2	Air Environment.....	178
4.2.1	Mitigation measures.....	178
4.2.2	Conclusion:	188
4.3	Impacts due to Transportation.....	188
4.3.1	Mitigation Measures.....	188
4.4	Water Environment.....	189
4.4.1	Wastewater Generation.....	189
4.4.2	Mitigate Measures.....	189
4.4.3	Rain Water Harvesting.....	190
4.5	Drainage pattern and Hydrogeology.....	190
4.5.1	Mitigation measures.....	190
4.6	Impact of Noise / Vibrations & Mitigation Measures.....	190
4.6.1	Impact of Noise on Working Environment.....	190
4.6.2	Noise due to Drilling, Excavation and Transportation.....	190
4.6.3	Noise Due to Blasting.....	191
4.6.4	Noise Impact Analysis on Community.....	191
4.6.5	Mitigate Measures.....	191
4.7	Impact of Vibration.....	192
4.7.1	Mitigate Measures.....	192
4.8	Impact on Human Settlement.....	192
4.9	Biological Environment.....	193
4.9.1	Mining activities and their impact on biodiversity.....	193
4.9.2	Existing Biological Scenario.....	193
4.9.3	Mitigate Measures.....	194
4.10	Flora and Fauna.....	194
4.10.1	Impact.....	194
4.10.2	Mitigation measures.....	194
4.10.3	Conservation Plan for Indian Peafowl (Peacock).....	195
4.11	Green Belt Development.....	196
4.12	Impacts on Occupational Health Due to Project Operations.....	196
4.12.1	Mitigate Measures for Occupational Health.....	196
4.12.2	Mitigate Measures for Safety Aspects.....	197
4.13	Impacts on Social Environment.....	197
4.14	Corporate Environmental Responsibility.....	198
5	ANALYSIS OF ALTERNATIVES.....	199

5.1	Alternate Technology	199
5.2	Method of mining	199
5.2.1	Opencast Method	199
5.3	Alternate Site	199
5.4	Connectivity	199
6	ENVIRONMENTAL MONITORING PROGRAMME.....	200
6.1	General	200
6.2	Monitoring Schedules for Various Environmental Parameters	200
6.2.1	Ambient Air Quality	201
6.2.2	Water Environment	201
6.2.3	Noise Measurement.....	201
6.3	Post Project Environmental Monitoring	202
6.3.1	Occupational Health and Safety	203
6.4	Environmental Monitoring Programme.....	203
7	ADDITIONAL STUDIES.....	205
7.1	Introduction	205
7.2	Public Consultation	205
7.3	Risk Identification & Management	205
7.3.1	Introduction	205
7.3.2	Identification of Hazards in Open Cast Mining	207
7.3.3	Disaster Management Plan.....	209
7.3.4	Mine Closure Plan.....	211
7.3.5	Social Impact Assessment R & R Action plan.....	214
8	PROJECT BENEFITS	215
9	ENVIRONMENTAL COST & BENEFIT ANALYSIS.....	216
10	ENVIRONMENTALMANAGEMENT PLAN	217
10.1	Environmental Management Plan	217
10.2	Emission Source Identification	217
10.3	Air Quality Management.....	217
10.3.1	Measures for dust suppression	217
10.3.2	Emissions from Material Handling	217
10.4	Noise Pollution Control.....	218
10.5	Water Pollution Control Measures.....	219
10.5.1	Surface Water.....	219
10.5.2	Mine Drainage Water	219
10.6	Land Environment.....	219
10.6.1	Top soil management	219
10.7	Solid Waste Management.....	220
10.8	Stabilization of Dumps.....	220

10.8.1 Measures to be adopted for Solid Wastes Management.....	220
10.9 Biological Environment	221
10.10 Granite Conservation and Development	221
10.11 Afforestation Plan	221
10.12 Occupational Health & Safety Measures	221
10.13 Socio-Economic Benefits	222
10.13.1 Employment potential	222
10.13.2 Care and Maintenance during Temporary Discontinuance	222
10.13.3 Safety and Security	222
10.14 Budget for Environmental Protection.....	222
10.15 Environment Policy of TAMIN	223
11 SUMMARY & CONCLUSION	226
11.1 Background	226
11.2 Management Commitment.....	226
11.3 Environmental Sensitive Areas	226
11.4 Black Granite Quarry Reserves.....	226
11.5 Summary of the Magnitude of Operation.....	227
11.5.1 Land requirement:	227
11.5.2 Water Requirement	227
11.5.3 Power & Fuel Requirement.....	227
11.5.4 Manpower	228
11.5.5 Solid Waste Generation & Management.....	228
11.5.6 Project Cost.....	228
11.6 Baseline Study.....	228
11.7 Anticipated Environmental Impacts.....	237
11.8 Greenbelt Development.....	238
11.9 Disaster Management Plan.....	238
11.10 Corporate Environmental Responsibility	238
11.11 Benefits of the Proposed Project	238
12 DISCLOSURE OF CONSULTANTS	240
12.1 Brief Profile of Hubert Enviro Care Systems (P) Limited (HECS)	240
12.2 Strengths of HECS	240
12.3 Quality Policy of HECS	241
12.4 QCI-NABET - EIA Accreditation.....	242

LIST OF FIGURES

Figure 2-1 Project Location Map	50
Figure 2-2 300 m Google Imagery of the lease area boundary	51
Figure 2-3 500m Radius Google Imagery of the project site	52
Figure 2-4 10km radius Google Imagery of the project site	53
Figure 2-5 Topo map of the study area	54
Figure 2-6 (a) Google image showing Environmental sensitive areas covering within 15 km from project boundary.....	55
Figure 2-7 (b) Google image showing Environmental sensitive areas covering within 15 km from project boundary.....	56
Figure 2-8 Geological Plan of the Granite Quarry	61
Figure 2-9 Geological Sections of the Granite Quarry.....	62
Figure 2-10 Conceptual sections of the quarry	63
Figure 2-11 Year wise production development Plan for the Next five years (2022-2023 to 2026-2027)	67
Figure 2-12 Schematic diagram of the mining process.....	70
Figure 2-13 Feasibility & Environmental Assessment Process	77
Figure 2-14 Waste Management Concept.....	84
Figure 3-1 Map showing the Satellite Image of the study area of Project	87
Figure 3-2 Topo Map of Study area.....	88
Figure 3-3 Environmental sensitive areas covering within 15 km from project boundary	91
Figure3-4 Mineral Map of TamilNadu.....	95
Figure 3-5 Land use/Land cover pattern for Dharmapuri district	97
Figure 3-6 Land use/Land cover Map of Dharmapuri district	98
Figure 3-7 Land use pattern of the Study Area	100
Figure 3-8 Land use map of the Study Area	101
Figure 3-9 Physical Map of Tamilnadu.....	103
Figure 3-10 Contour map of the Study Area.....	104
Figure 3-11 Geomorphology pattern of the study area	106
Figure 3-12 Geomorphology Map of the study area	107
Figure 3-13 Geomorphology Map of Study Area	108
Figure 3-14Hydrogeology Map of Thiruvallur District	109
Figure 3-15 Drainage map of the study area	111
Figure 3-16 Geology Map of Tamilnadu	112
Figure 3-17 Seismicity Map of India	113
Figure 3-18 Soil map of India	115
Figure 3-19 Wind hazard Map of India.....	116
Figure 3-20 Wind Rose during Mid of January 2023 to mid of April 2023	119
Figure 3-21 Atmospheric inversion level at the project site.....	120
Figure 3-22 Map showing the Ambient Air Quality monitoring locations	122
Figure3-23 Trends of Measured Ambient Concentrations in theStudyArea.....	127
Figure 3-24 Map showing the noise monitoring locations.....	131
Figure 3-25 Map showing the surface water monitoring locations	134
Figure 3-26 Depth to water level of Dharmapuri District	138
Figure 3-27 Map showing the groundwater monitoring locations	140
Figure 3-28 Map showing the soil monitoring location	146

Figure 4-1 Wind rose diagram considered for Dispersion Modeling.....	180
Figure 4-2 Predicted 24 hrs GLC's of TSPM within 10 km radius of the Study area	183
Figure 4-3 Predicted 24 hrs GLC's of PM ₁₀ within 10 km radius of the Study area.....	184
Figure 4-4 Predicted 24-Hrs' GLC's of PM _{2.5} within 10 km Radius of the Study Area.....	185
Figure 4-5 Predicted 24-Hrs' GLC's of SO ₂ within 10 km Radius of the Study Area	186
Figure 4-6 Predicted 24-Hrs' GLC's of NO _x within 10 km Radius of the Study Area	187
Figure 7-1 Identification of hazards in opencast mine.....	207
Figure 10-1 Hierarchical System of the TAMIN	225

LIST OF TABLES

Table 1-1 Boundary Co-Ordinates of the Project site	21
Table 2-1 Summary of Project Reserves (Black Granite)	47
Table 2-2 Summary of Project Reserves(Quartzo Feldspathic Gneiss)	48
Table 2-3 Project Summary & Salient Features within 15km radius of the lease area boundary	57
Table 2-4 Nearest Human Settlement	58
Table 2-5 Land use Pattern of the quarry area	59
Table 2-6 Black Granite Updated Geological reserves as on 30.09.2021	64
Table 2-7 Updated Geological Reserves as on 30.09.2021(Granitic Gneiss)	64
Table 2-8 Updated Mineable reserves as on 30.09.2021	65
Table 2-9 Yearwise Development/ Production for the Five Years (2022-2027) Black granite	66
Table 2-10 Yearwise Development/Production for the Five Years (2022-2027) Granitic Gneiss	66
Table 2-11 Project cost of the project	68
Table 2-12 Quarry Land details	73
Table 2-13 Land Use Pattern of the quarry area	73
Table 2-14 Water requirement breakup.....	74
Table 2-15 Fuel requirement	74
Table 2-16 List of Machineries	74
Table 2-17 Manpower Details.....	75
Table 2-18 Municipal Solid Waste generation & Management.....	75
Table 2-19 Hazardous Waste Management.....	75
Table 3-1 Environmentally Sensitive Areas within 15km from Project Boundary.....	89
Table 3-2 District land use/land cover statistics (2015-16) for Dharmapuri district.....	96
Table 3-3 Land use pattern of the Study Area.....	99
Table 3-4 Geomorphology pattern of the study area.....	105
Table 3-5 Climatological Summary– Chennai (Minambakkam) (1991-2020)	118
Table 3-6 Meteorology Data for the Study Period (January 2023 to March 2023).....	119
Table 3-7 Details of Ambient Air Quality Monitoring Locations.....	121
Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters	123
Table 3-9 Summary of the average baseline concentrations of pollutants	125
Table 3-10 Day and Night Equivalent Noise Levels.....	128
Table 3-11: Test methods used for the analysis of water quality parameters.....	132
Table 3-12: Details of Surface water sampling locations.....	133
Table 3-13 Surface Water Monitoring Results.....	135
Table 3-14 Details of Groundwater Quality Monitoring Locations	139
Table 3-15 Physico chemical analysis of Ground water samples from study	141
Table 3-16 Soil & Sediment Quality Monitoring Locations	145
Table 3-17 Soil & Sediment Quality Monitoring Results	147
Table 3-18 Social Indicators	161
Table 3-19 Population profile within the study area	163
Table 3-20 Summaries of Employment and Livelihood within the study area	167
Table 3-21 Details of Education facilities within study area	170
Table 3-22 Literates population and the percentage within the study area	171
Table 3-23 Summaries of Socio-economic indicators within the study area	174
Table 4-1 Land Use Pattern of the quarry area	177
Table 4-2 - Sources of air pollution at quarry	178

Table 4-3 Fugitive dust control in mine	178
Table 4-4 Dust control measures in quarry	179
Table 4-5 Overview of the Source Parameters.....	181
Table 4-6 Emission from Mining Equipments	182
Table 4-7 Vehicular Sources Emission details.....	182
Table 4-8 Emission Considered for Mining Activity	182
Table 4-9 Emission input for modeling.....	182
Table 4-10 Predicted Top 10 Highest Concentration of TSPM	183
Table 4-11 Predicted Top 10 Highest Concentration of PM ₁₀	184
Table 4-12 Predicted Top 10 Highest Concentration of PM _{2.5}	185
Table 4-13 Predicted Top 10 Highest Concentration of SO ₂	186
Table 4-14 Predicted Top 10 Highest Concentration of NO _x	187
Table 4-15 Total Maximum GLCs from the Mining Emissions	188
Table 4-16 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)	190
Table 4-17 Impacts on Biodiversity	193
Table 4-18 Conservation Plan for Peacock for five years conservation Plan	195
Table 4-19 Mitigation for occupational health and safety	196
Table 6-1 Environment (Protection) Rules 1986	201
Table 6-2 Post Project Environmental Monitoring Program.....	202
Table 6-3 Environmental Management Plan.....	203
Table 10-1 Environmental Monitoring Cost	222
Table 11-1 Fugitive dust control in mine	237
Table 11-2 Land Use Pattern of the lease area.....	237



List of Annexures

Annexure No	Name of the Annexure
1	Quarry Lease Agreement
2	ToR obtained from SEIAA
3	TAMIN Environmental Policy
4	Department of Geology and Mining Approval Letter for SOM-II
5	Scheme of Mining II with RQP Certificate
6	Sectional Plates of SOM II
7	A Register
8	Production Details

LIST OF ABBREVIATIONS

AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
AGL	Above Ground Level
ARL	Above Roof Level
AMSL	Above Mean Sea Level
BGL	Below Ground Level
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
DMP	Disaster Management Plan
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
ETP	Effluent Treatment Plant
GLC	Ground Level Concentration
GO	Government Order
ISO	International Organization for Standardization
kWh	Kilowatt Hour
MSDS	Material Safety Data Sheet
MMR	Metalliferous Mines Regulations
NAAQ	National Ambient Air Quality
PCU	Passenger Car Unit
R & D	Research & Development
RA	Risk Assessment
ROM	Run of Mines
SOM	Scheme of Mining
SEIAA	State Environmental Impact Assessment Authority
SEAC	State Expert Appraisal Committee
TAMIN	Tamil Nadu Minerals Limited
TDS	Total Dissolved Solids
TNPCB	Tamil Nadu Pollution Control Board
TOR	Terms of Reference
TSDF	Treatment, Storage and Disposal Facility
kVA	kilo Volt Ampere

1 INTRODUCTION OF THE PROJECT

1.1 Project Back Ground

The total extent area of the quarry is 16.54.0 Ha, at S.F.No.287 (Panchapalli-9.54.0Ha) &19 (Namandahalli-7.06.0Ha), Panchapalli & Namandahalli Villages, Palacode Taluk, Dharmapuri District, and Tamil Nadu State. Quarry Land is classified as Government Poramboke land and the lease is obtained by Tamil Nadu Minerals Limited (TAMIN).

The lease area is exhibits hilly terrain covered by massive black granite formation. Mining lease was obtained vide G.O. (3D) No.52, Industries (MME.1) department, dated: 11.11.2011 for 30 years from 16.02.2012 to 15.02.2042. Meanwhile, an amendent was issued for quarrying Country Rock (Granitic Gneiss) for making M sand in the same lease hold area without changing the lease period vide G.O.(MS) No.108, Industries (MME.1) department, dated: 04.08.2016. Lease documents are enclosed as **Annexure –1**.

The Mining plan was approved with 10% recovery for Dolerite and 100% recovery for Granite Gneiss by the Commissioner of Geology & mining, Chennai vide letter No. 6002/ML3/2016, dated 26.10.2016. The lease area is hillock with a height of 45m surrounded by plain lands on four sides. The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF&CC notification 14.09.2006 and 16.08.2018. Form –I and feasibility report was prepared for prescribing ToR.Proposal No.SIA/TN/INFRA2/92047/2019.

In 347th SEIAA meeting held on 13.01.2023 and the ToR issued vide Lr. No. SEIAA-TN/F.No.6709/SEAC/1(a)/ToR-1339/2022, dated: 16.02.2023 for the preparation of EIA/EMP report with ecological damage assessment, remediation plan, natural resource augmentation plan and community resource augmentation plan.

1.2 Purpose and Status of the Report

The quarry site is located at S.F.No.287 (Panchapalli) &19 (Namandahalli), Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu State. The proposed lease area for mining of black granite&granite gneiss is 16.54.0 Ha. The land use classification of the project site is Government Poramboke land. Mining lease was obtained vide G.O. (3D) No.52, Industries (MME-1) department, dated 11.11.2011 for 30 years from 16.02.2012 to 15.02.2042. Lease documents are enclosed as **Annexure –1**.

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF&CC notification and its amendment vide S. O. 3933(E) dated 18th December 2017. Form – I and Pre feasibility report was prepared for prescribing ToR.

1.3 Identification of Project & Project Proponent

1.3.1 Project

The proposed Black Granite & Granitic Gneiss Mine is over an Extent of 16.54.0 Ha located in S.F.No: 287 (Panchapalli Village) & 19 (Namandahapalli Village), Panchapalli & Namandahapalli Villages, Palacode Taluk, Dharmapuri District lies in the latitude of 12°28'33.38" N to 12°28'53.66" N and longitude of 77°57'32.69" E to 77°57'59.54" E. The area is marked in the survey of India Topo sheet No: 57L/2, 3 & 57H/14, 15. The black granite and granitic gneiss quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & width bench not less than the height. The area applied for quarry lease is exhibits hilly terrain; the altitude of the area is above 652-703 m AMSL.

1.3.2 Project Proponent

Tamil Nadu Minerals Ltd also called TAMIN (An Undertaking of Government of Tamil Nadu) has been established in the year 1978 and it entered the international granite market in the year 1979 and has secured a steady market for dimensional blocks of black and other color materials in countries like Japan, Germany, Italy, Australia, UK, Switzerland, Holland, USA etc. TAMIN is only organization recognized by Bureau of Indian Standard for manufacture and supply of I.S. Sand all over the country. TAMIN has developed expertise in the mining of granite dimensional stones of different varieties including black granite (Dolerite), Kashmir white (Leptynite), Paradiso (Migmatite gneiss), Green onyx (Syenite - porphyry) Red wave (Pink Feldspathic gneiss) Colombo Juparana (Pegmatitic granite gneiss of migmatitic origin), Raw silk (Yellow feldspathic Lepthnite) and a number of other colored granite varieties apart from other industrial minerals viz. quartz and feldspar, graphite, lime stone, silica sand, vermiculite, etc.

1.4 Brief Description of the Project

1.4.1 Nature of the Project

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF & CC notification. The Project focuses on minig of Dolerite & Country rock commercially known as "Bengal Black Granite Dimensional Stone" over an extent of 16.54.0 Ha.

1.4.2 Size of the Project

The total extent area of the lease for this quarry is 16.54.0 Ha, at S.F.No: 287 (Panchapalli-9.48.0Ha) & 19 (Namandahalli-7.06.0Ha), Panchapalli & Namandahalli Villages, Palacode Taluk, Dharmapuri District, and Tamil Nadu State. Quarry Land is classified as Government Poramboke land and leased to Tamil Nadu Minerals Limited (TAMIN).

The updated geological reserves of black granite estimated based on the geological cross-sections was 7,95,808 m³ as on 30.09.2021. By applying the 10% recovery, the updated geological effective reserve as 79,581 m³. The updated Mineable Reserves of black granite is 6,16,994 m³ as on 30.09.2021. By applying 10% recovery, the updated Mineable effective reserve as 61,699 m³. The annual peak production would be 3,253 m³.

The updated geological reserves of granitic gneiss estimated based on the geological cross-sections was 41,45,783m³ as on 30.09.2021. By applying the 100% recovery, the updated geological effective reserve as 41,45,783m³. The updated Mineable reserves of granitic gneiss estimated based on the geological cross-sections was 28,66,968m³ as on 30.09.2021. By applying the 100% recovery, the updated geological effective reserve as 28,66,968m³. The annual peak production would be 4,71,221m³.

1.4.3 Location of the Project

The black granite & genetic gneiss mine is over an extent of 16.54.0 Ha located in 287 (Panchapalli) & 19 (Namandahalli), Panchapalli & Namandahalli Villages, Palcode Taluk, Dharmapuri District, and Tamil Nadu State, lies in the latitude of 12°28'33.38" N to 12°28'53.66" N and longitude of 77°57'32.69" E to 77°57'59.54" E. The area is marked in the survey of India Topo sheet No: 57L/2, 3 and 57H/14, 15. Site Elevation is 652m-703m AMSL. The boundary coordinates of the project site are given in **Table 1-1**.

Table 1-1 Boundary Co-Ordinates of the Project site

S.No	Latitude	Longitude
TM1	12°28'48.69"	77°57'45.80"
TM2	12°28'47.48"	77°57'46.41"
TM3	12°28'45.38"	77°57'48.34"
TM4	12°28'41.05"	77°57'54.84"
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TM6	12°28'36.07"	77°57'55.35"
TM7	12°28'36.67"	77°57'56.74"
TM8	12°28'35.63"	77°57'59.54"
TM9	12°28'33.95"	77°57'59.39"
TM10	12°28'33.87"	77°57'57.77"
TM11	12°28'33.38"	77°57'57.50"
TM12	12°28'34.19"	77°57'55.09"
TM13	12°28'34.85"	77°57'51.03"
TM14	12°28'40.88"	77°57'47.00"
TM15	12°28'45.80"	77°57'45.80"
TM16	12°28'45.47"	77°57'40.27"
TM17	12°28'44.06"	77°57'38.76"
TM18	12°28'41.57"	77°57'39.96"
TM19	12°28'38.14"	77°57'38.30"

S.No	Latitude	Longitude
TM20	12°28'37.76"	77°57'37.76"
TM21	12°28'38.33"	77°57'36.18"
TM22	12°28'38.09"	77°57'34.56"
TM23	12°28'39.43"	77°57'33.31"
TM24	12°28'41.89"	77°57'34.77"
TM25	12°28'42.95"	77°57'32.69"
TM26	12°28'47.58"	77°57'34.93"
TM27	12°28'52.33"	77°57'37.46"
TM28	12°28'53.66"	77°57'38.14"
TM29	12°28'51.86"	77°57'41.79"

1.4.4 Connectivity of the Project

The nearest railway station is Rajakkottai railway station which is about 7.65km on North East side. The project site is adjacent to the SH 85 i.e., Rajakkotai – Mathigiri road approximately 6.94 km on North of North East direction. The NH 844 Hosur-Dharmapuri road is around 6.42 km in the East direction.

1.5 Need for the project and its importance to the country and or region

The black granite and granitic gneiss dimensional stone material by virtue of its pleasing color and texture such as and its best ability to take polishing and appealing look in polished product has attracted the consumers in the building construction and interior decoration industries. The domestic market capabilities have also been explored in recent periods. Bulk quantity of the blocks produced are exported as raw blocks and some quantity is being processed at TAMIN's Granite processing units and exported as value added finished products.

The earning source in the targeted area is limited, most of the people in and around the area depend upon the seasonal agriculture and much of the people migrate to nearby towns where good industries and factories are growing up. Through this project will give employment opportunities to 30 direct and 20 indirect employees.

1.6 EIA Study

As a part of compliance to the regulatory requirement i.e., to obtain Environmental Clearance from SEIAA, TN, has appointed Environmental Consultants accredited by National Accreditation Board for Education and Training (NABET)-Quality Council of India (QCI), New Delhi.

The work of undertaking field studies and preparation of EIA/EMP report under B2 category, was assigned to M/s Hubert Enviro Care Systems (P) Ltd. (HECS) Chennai by the project proponent. HECS is accredited by NABET, vide possession of Certificate No: NABET/EIA/2224/SA 0190, valid up to 27.07.2024.

1.7 EIA Cost

EIA study was undertaken by HECS for an amount of Rs. 1, 54, 225 Lakhs. The base line monitoring was done by HECS lab, Chennai, an NABL and MoEF Accredited Laboratory.

1.8 Scope of the Study

The scope of the work mentioned includes an assessment study of Granite mining project and their impact on the region. This study puts forward the most effective ways to protect the environment from increasing pollution caused by the mining activities and recommendations for environmental-friendly development initiatives in the region.

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social and economic aspects, i.e., aiming at “Sustainable Development” due to the project activities.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may rise during the quarry operational phases of the project. This report also highlights the Environmental Monitoring Program during the operation phase of the project and the post mined quarry management program. The generic structure of the EIA document will be as per the EIA Notification of the MoEF&CC dated 14thSeptember 2006 and subsequent amendments. The basic structure of the report will be as under:

Chapter 1: Introduction

Introductory information is presented in this Chapter. The introduction chapter provides background to the project, project proponent and describes the objective of this document. The purpose and organization of the report is also presented in this chapter.

Chapter 2: Project Description

This Chapter includes project description and infrastructure facilities delineating all the quarry operations and environmental aspect of the granite quarry operation phase activities.

Chapter 3: Description of the Environment

This Chapter provides baseline environmental status of environmental components (Primary data) delineating meteorological details of the project site and surrounding area.

Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This Chapter presents the analysis of impacts on the environmental and social aspects of the project as a result of establishment of plan and thereby suggesting the mitigation measures.

Chapter 5: Analysis of Alternatives (Technology and Sites)

This chapter includes the justification for the selection of the project site from environmental point of view as well as from economic point of view.

Chapter 6: Environmental Monitoring Program

This chapter will include the technical aspects of monitoring, the effectiveness of mitigation measures which will include the measurement methodologies, frequency, location, data analysis, reporting schedules etc,

Chapter 7: Additional Studies

This chapter will detail about the Public Consultation sought regarding the project. It will also identify the risks of the project in relation to the general public and the surrounding environment during quarry operation phase and thereby presents Disaster Management Plan. Social impact assessment and R&R action plans (if any).

Chapter 8: Project Benefits

This chapter deals with improvement in physical and social infrastructures, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit analysis

Not recommended during scoping

Chapter 10: Environmental Management Plan

This is the key Chapter of the report and presents the mitigation plan, covers the institutional and monitoring requirements to implement environmental mitigation measures and to assess their adequacy during project implementation.

Chapter 11: Summary and Conclusion

This chapter summarizes the information given in Chapters in this EIA/EMP report and the conclusion based on the environmental study, impact identification, mitigation measures and the environmental management plan.

Chapter 12: Disclosure of the Consultant

Names of consultants engaged in the preparation of the EIA/EMP report along with their brief resume and nature of Consultancy rendered are included in this Chapter.

1.9 Objectives of the Study

- To ensure environmental considerations are explicitly addressed and incorporated into the development decision-making process.
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of the above project proposal.
- To protect the productivity and capacity of natural systems and the ecological processes which maintain their respective functions
- To promote development that is sustainable and optimizes resource use as well as management opportunities.
- To fully recognize the scope and requirements of the TOR and comply with the same.

- The major objective of this study is to prepare a detailed Environmental Impact Assessment Study within the study area i.e 10 km radius from the project.

1.10 Methodology adopted for the Study

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social and economic aspects, i.e., aiming at “Sustainable Development” due to the project activities.

1.11 Applicable Regulatory Framework

The EIA process followed for this EIA report is composed of the following stages:

1. Study of project information.
2. Screening & Scoping.
3. Environmental pre-feasibility study & application for approval of TOR.
4. Collection of detailed project management plan/report.
5. Baseline data collection.
6. Impact identification, Prediction & Evaluation.
7. Mitigation measures & delineation of EMP.
8. Risk assessment and safety & disaster management plan.
9. Review & finalization of EIA Report based on the TOR requirements.
10. Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

1.12 Legal Complicability

The establishment and functioning of mining industry will be governed by the following environmental acts/regulations besides the local zoning and land use laws of the States.

- The Water (Prevention and Control of Pollution) Act, 1974 as amended
- The Water (Prevention and Control of Pollution) Cess Act, 1977, as amended
- The Air (Prevention and Control of Pollution) Act, 1981 as amended (Air Act).
- The Noise Pollution and Regulation Act: 2000
- The Environment (Protection) Act, 1986 (EPA)
- The Wildlife (Protection) Act, 1972 as amended
- The Forest (Conservation) Act, 1980 as amended
- The Public Liability Insurance Act, 1991
- The Mines and Minerals (Regulation and Development) Act, 1957 as amended
- Circulars issued by the Director-General Mines Safety (DGMS).
- Contract Labor Regulation and Abolition Act 1970
- The Motor Vehicles Act – 1989
- PESO – Explosives and handling of Hazardous Material: 1934.



1.13 Terms of Reference Compliance

The Terms of Reference (ToR) issued by SEIAA-Tamil Nadu compliance is given as follows:

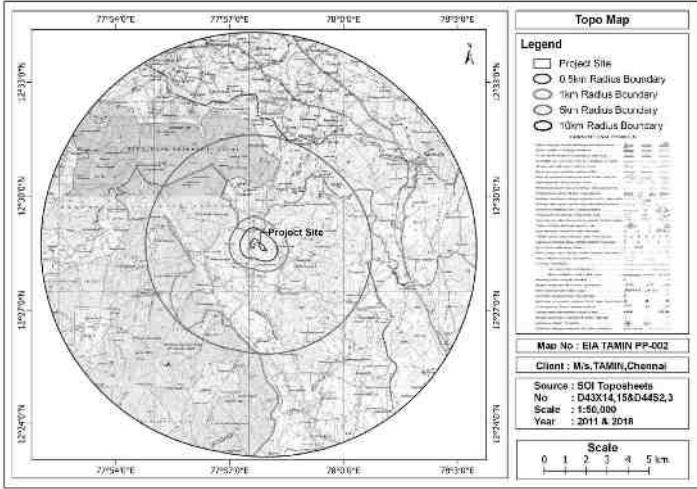
1.13.1 Standard Terms of Reference

S.No	ToR Point	Compliance																											
1.	Year wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed there had been any increase in production after the EIA Notification 1994 came into force, w.r.t the highest production achieved prior to 1994.	Initial G.O: (3D) No.52 Industries (MME.1) Department- 30 Years. From 16.02.2012 to 15.02.2042 Ammendment G.O (Ms) No.108 Industries (MME.1) Department, 30 years of Quarry lease period is from 16.02.2012 to 15.02.2042. The Information given in Chapter 1 , Mining lease GO enclosed as Annexure –I . The production details are provided in Chapter 2, Section 2.7, Table 2-9 to Table 2.11 .																											
2.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Mining lease document is enclosed as Annexure –I .																											
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mines lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted, All Mining Plan, EIA & Lease obtained by Tamil Nadu Minerals Limited only.																											
4.	All corners co-ordinates of the mine lease area, superimposed on High Resolution Imagery/ toposheets, topographic sheets, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Corners co-ordinates of the mine lease area: <table border="1"><thead><tr><th>S.No</th><th>Latitude</th><th>Longitude</th></tr></thead><tbody><tr><td>TM1</td><td>12°28'48.69"</td><td>77°57'45.80"</td></tr><tr><td>TM2</td><td>12°28'47.48"</td><td>77°57'46.41"</td></tr><tr><td>TM3</td><td>12°28'45.38"</td><td>77°57'48.34"</td></tr><tr><td>TM4</td><td>12°28'41.05"</td><td>77°57'54.84"</td></tr><tr><td>TM5</td><td>12°28'39.06"</td><td>77°57'55.48"</td></tr><tr><td>TM6</td><td>12°28'36.07"</td><td>77°57'55.35"</td></tr><tr><td>TM7</td><td>12°28'36.67"</td><td>77°57'56.74"</td></tr><tr><td>TM8</td><td>12°28'35.63"</td><td>77°57'59.54"</td></tr></tbody></table>	S.No	Latitude	Longitude	TM1	12°28'48.69"	77°57'45.80"	TM2	12°28'47.48"	77°57'46.41"	TM3	12°28'45.38"	77°57'48.34"	TM4	12°28'41.05"	77°57'54.84"	TM5	12°28'39.06"	77°57'55.48"	TM6	12°28'36.07"	77°57'55.35"	TM7	12°28'36.67"	77°57'56.74"	TM8	12°28'35.63"	77°57'59.54"
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		TM27	12°28'52.33"	77°57'37.46"
		TM28	12°28'53.66"	77°57'38.14"
		TM29	12°28'51.86"	77°57'41.79"

All corners co-ordinates of the mine lease area are given in **Chapter 1, Section 1.4.3 & Table 1-1.**

S.No	ToR Point	Compliance
5.	Information should be provided in Survey of India Toposheets in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	 <p>Topo map prepared in 1:50000 scale and given as Figure 3-2 in Chapter 3.</p>
6.	Details about the land proposed for mining activities should be given with information as to whether mining confirms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The Information given in Chapter- 1, Section 1.2 & Mining lease enclosed as Annexure –I . The production details are provided in Chapter 2, Section 2.6 & Section 2.7, Table 2.9 to 2.11
7.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environment or forest norms/condition? The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring	Noted. Enclosed as Annexure-V .

S.No	ToR Point	Compliance
	<p>compliance with the EC conditions may also be given. The system of reporting of non-compliance/ violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA report.</p>	
8.	<p>Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.</p>	<p>Open cast, semi-mechanized mining with 6m vertical bench with a bench width of 6m has been proposed. Mining methodology is provided in Chapter 2 and Section 2.9.</p>
9.	<p>The study area will comprise of 10km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine/lease period.</p>	<p>Noted. The study area of 10km zone around the mines lease from lease periphery and furnished in Chapter 3.</p>
10.	<p>Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass, preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.</p>	<p>Land use pattern is given in Chapter 3 and Section 3.5.4, Figure 3-4, Figure3-5, Table3-2, Table 3-3, Figure 3-7 & Figure 3-8.</p>
11.	<p>Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.</p>	<p>Land use pattern is given in Chapter 3 and Section 3.5.4, Figure 3-4, Figure3-5, Table3-2, Table 3-3, Figure 3-7 & Figure 3-8. Over burden disposed within the lease area photo is give in Figure 2-9</p>

S.No	ToR Point	Compliance																																																							
12.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry of ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	<p>Not applicable. No Forest land involved in this project.</p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Reserve Forests</th> <th>Distance (km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr><td>1.</td><td>Udedurgam RF</td><td>0.88</td><td>WNW</td></tr> <tr><td>2.</td><td>Marandahalli Ext RF</td><td>2.78</td><td>WSW</td></tr> <tr><td>3.</td><td>Aiyur RF</td><td>5.54</td><td>WSW</td></tr> <tr><td>4.</td><td>Aiyur Ext RF</td><td>6.36</td><td>W</td></tr> <tr><td>5.</td><td>Marandahalli RF</td><td>7.36</td><td>SSW</td></tr> <tr><td>6.</td><td>Denkanikota RF</td><td>10.87</td><td>WNW</td></tr> <tr><td>7.</td><td>Sameri RF</td><td>12.55</td><td>SW</td></tr> <tr><td>8.</td><td>Galligattam RF</td><td>12.75</td><td>SSW</td></tr> <tr><td>9.</td><td>Aiyur Ext No.2 RF</td><td>13.72</td><td>SW</td></tr> <tr><td>10.</td><td>Nayanasandiram Agraharam RF</td><td>13.82</td><td>SW</td></tr> <tr><td>11.</td><td>Kolatti RF</td><td>14.45</td><td>WSW</td></tr> <tr><td>12.</td><td>Toluvabetta RF</td><td>14.91</td><td>SW</td></tr> </tbody> </table>				S. No	Reserve Forests	Distance (km)	Direction	1.	Udedurgam RF	0.88	WNW	2.	Marandahalli Ext RF	2.78	WSW	3.	Aiyur RF	5.54	WSW	4.	Aiyur Ext RF	6.36	W	5.	Marandahalli RF	7.36	SSW	6.	Denkanikota RF	10.87	WNW	7.	Sameri RF	12.55	SW	8.	Galligattam RF	12.75	SSW	9.	Aiyur Ext No.2 RF	13.72	SW	10.	Nayanasandiram Agraharam RF	13.82	SW	11.	Kolatti RF	14.45	WSW	12.	Toluvabetta RF	14.91	SW
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13.	Status of forestry clearance for the broken up area and virgin forest land involved in the project including deposition of Net Present Value (NPV) & Compensatory Afforestation (CA) should be indicated. A copy of the forest clearance should also be furnished.	<p>No Forest land is involved in existing quarry. No Forest Clearance is required.</p>																																																							
14.	Implementation status of recognition of forest right under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Acts, 2006 should be indicated.	<p>Not applicable. No scheduled tribes and other traditional forest dwellers are observed.</p>																																																							
15.	The vegetation in the RF/PF areas in the study area, with necessary details, should be given.	<table border="1"> <thead> <tr> <th>S. No</th> <th>Reserve Forests</th> <th>Distance (km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr><td>1.</td><td>Udedurgam RF</td><td>0.88</td><td>WNW</td></tr> <tr><td>2.</td><td>Marandahalli Ext RF</td><td>2.78</td><td>WSW</td></tr> </tbody> </table>				S. No	Reserve Forests	Distance (km)	Direction	1.	Udedurgam RF	0.88	WNW	2.	Marandahalli Ext RF	2.78	WSW																																								
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S.No	ToR Point	Compliance				
		3.	Aiyur RF	5.54	WSW	<p>The details of Environmental sensitive areas & Reserve forests covering within 15 km from project boundary are given in Chapter 3 and Section 3.4 & Table 3-1.</p>
		4.	Aiyur Ext RF	6.36	W	
		5.	Marandahalli RF	7.36	SSW	
		6.	Denkanikota RF	10.87	WNW	
		7.	Sameri RF	12.55	SW	
		8.	Galligattam RF	12.75	SSW	
		9.	Aiyur Ext No.2 RF	13.72	SW	
		10.	Nayanasandiram Agraharam RF	13.82	SW	
		11.	Kolatti RF	14.45	WSW	
		12.	Toluvabetta RF	14.91	SW	
16.	A study shall be got done to ascertain the impact of the mining project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigate measures required, should be worked out with cost implications and submitted.	Detailed mitigate measures are furnished in Chapter 4.				
17.	Location of National Parks, Sanctuaries, Biosphere Reserves, wildlife Corridors, Ramsar site Tiger/Elephant Reserves (existing as well as proposed), if any, within 10km of the mines lease should be clearly indicated, supported by a location map duly authenticated by chief wildlife warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the standing committee of National Board of Wildlife and copy furnished.	The details of environmental sensitive areas covering within 15 km from project boundary are given in Chapter 3 and Section 3.4. & Table 3-1.				

S.No	ToR Point	Compliance
18.	<p>A detailed biological study area [core zone and buffer (10km radius of the periphery of the mines lease)] shall be carried out. Details of the flora and fauna, endangered, endemic and RET species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the schedule of the fauna present. In case of any scheduled I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with state forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.</p>	<p>Details of the flora and fauna, endangered, endemic and RET species for core and buffer zone is given in Chapter 3 and Section 3.11.</p> <p>There is one scheduled I species isfound in the study area, the conservation plan is prepared and given in Chapter 3, Section 3.11.13.</p>
19.	<p>Proximity to areas declared as ‘Critically Polluted’ or the project areas likely to come under the ‘Aravali Range’, (attracting court restrictions for mining operations) should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.</p>	<p>There is no critical polluted area within 15km radius of the project site.</p>
20.	<p>Similarly, for coastal projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mines lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: the mining projects falling under CRZ would also need to obtain</p>	<p>There is no Coastal Zone within 15km radius of the project site.</p>



S.No	ToR Point	Compliance
	approval of the concerned Coastal Zone Management Authority).	
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SC's/ST's and other weaker sections of the society in the study area, a need based sample survey, family-wise should be undertaken to assess their requirements and their action programmes prepared and submitted accordingly, integrating the sectoral programmes of the line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	There is no Rehabilitation and resettlement is involved. Land classified as a Government poramboke land. Mining lease obtained dated 06.02.2012 from Govt. of Tamil Nadu for 30 years. Validity up to 15.02.2042.
22.	One season (non monsoon) i.e. March-May (summer season), October-December (post monsoon season), December-February (Winter season) primary baseline data on ambient air quality as per CPCB notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so complied presented date wise in the EIA and EMP report. Site specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in	The primary baseline data monitored covered three (3) months i.e., from Mid of Jan 2023 – Mid of April 2023 , and secondary data was collected from Government and Semi-Government organizations. The primary baseline data results and discussion furnished in Chapter 3 .

S.No	ToR Point	Compliance																																				
	view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM ₁₀ , particularly for free silica, should be given.																																					
23.	Air quality modeling should be carried out for prediction of impacts of the project on the air quality of the area. It should also take into account the impact of the movement of vehicles for transportation of minerals. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on allocation map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may be also indicated on the map.	<table border="1"> <thead> <tr> <th>Pollutant</th> <th>Max. Base Line Conc. (µg/m³)</th> <th>Estimated Incremental Conc. (µg/m³)</th> <th>Total Conc. (µg/m³)</th> <th>NAAQ standard</th> <th>% contribution of concentration above Base line</th> </tr> </thead> <tbody> <tr> <td>TSPM</td> <td>152.53</td> <td>23.89</td> <td>176.42</td> <td>500</td> <td>15.66</td> </tr> <tr> <td>PM₁₀</td> <td>61.01</td> <td>2.62</td> <td>63.63</td> <td>100</td> <td>4.29</td> </tr> <tr> <td>PM_{2.5}</td> <td>41.26</td> <td>1.57</td> <td>42.83</td> <td>60</td> <td>3.81</td> </tr> <tr> <td>SO₂</td> <td>14.48</td> <td>0.16</td> <td>14.64</td> <td>80</td> <td>1.10</td> </tr> <tr> <td>NO_x</td> <td>34.08</td> <td>1.25</td> <td>35.33</td> <td>80</td> <td>3.67</td> </tr> </tbody> </table> <p>Air quality modeling carried out for prediction of impacts of the project on the air quality of the area. The details are given in Chapter 4 and Section 4.2.1.2 & 4.2.1.3.</p>	Pollutant	Max. Base Line Conc. (µg/m ³)	Estimated Incremental Conc. (µg/m ³)	Total Conc. (µg/m ³)	NAAQ standard	% contribution of concentration above Base line	TSPM	152.53	23.89	176.42	500	15.66	PM ₁₀	61.01	2.62	63.63	100	4.29	PM _{2.5}	41.26	1.57	42.83	60	3.81	SO ₂	14.48	0.16	14.64	80	1.10	NO _x	34.08	1.25	35.33	80	3.67
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24.	The water requirement for the project, its availability and sources should be furnished. A detailed water balance should be provided. Fresh water requirement for the project should be indicated.	<table border="1"> <thead> <tr> <th>S. No</th> <th>Description</th> <th>Water Requirement(KLD)</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Drinking water & Domestic purpose</td> <td>0.5</td> </tr> <tr> <td>2.</td> <td>Wire saw cutting purpose</td> <td>0.3</td> </tr> <tr> <td>3.</td> <td>Dust suppression</td> <td>0.3</td> </tr> <tr> <td>4.</td> <td>Green belt</td> <td>0.4</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>1.5</td> </tr> </tbody> </table> <p>The water requirement for the project is 1.5 KLD and breakup is addressed in Chapter 2 and Section 2.10.2 & Table 2-14.</p>	S. No	Description	Water Requirement(KLD)	1.	Drinking water & Domestic purpose	0.5	2.	Wire saw cutting purpose	0.3	3.	Dust suppression	0.3	4.	Green belt	0.4	Total		1.5																		
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25.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.	No ground water withdrawn to met the water requirement. The total water requirement is sourced from Private tank suppliers.																																				

S.No	ToR Point	Compliance
26.	Description of water conservation measures proposed to be adopted in the project should be given. Details of rainwater harvesting proposed in the project, if any, should be provided.	<p>Surface Water Pollution Control Measures</p> <ul style="list-style-type: none"> ➤ Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas. ➤ During monsoon season, the rain water is being collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development. ➤ The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB. <p>Ground Water Pollution Control Measures</p> <ul style="list-style-type: none"> ➤ The domestic sewage from the canteen and toilets will be routed to septic tanks. ➤ Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out. <p>Rain Water Harvesting</p> <ul style="list-style-type: none"> ➤ The rainwater is being diverted towards the middle of the mine to prevent water entering the mine working. The rainwater flows will also contain fines both from surface and waste dumps during seasonal flows. As such, it is being proposed to have structures in such a way to act as settling pond and also for rainwater harvesting. <p>Water conservation measures are proposed in Chapter 4 and Section 4.4.2 & Section 4.4.3.</p>
27.	Impact of the project on the water quality, both surface and ground water, should be assessed and necessary safeguard measures, if any required, should be provided.	Impacts on water environment & water conservation measures are proposed in Chapter 4 Section 4.4.
28.	Based on actual monitored data, it may clearly be shown whether working will intersect ground water. Necessary data and documentation in this regard may be provided. In case the working will intersect ground water table, a detailed Hydro Geological Study should be undertaken and	<p>The mining activity proposed in depth of 30m from top of the hillock as per mining Plan.</p> <p>Water table is found at a depth of 35m below ground level as per mining Plan.</p> <p>Water requirement is met through private water supply. There is no withdrawal of ground water.</p>

S.No	ToR Point	Compliance
	<p>report furnished. The report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of groundwater should also be obtained and copy furnished.</p>	
29.	<p>Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion proposed, if any, and the impacts of the same on the hydrology should be brought out.</p>	Nil
30.	<p>Information on site elevation, working depth, groundwater table etc. should be provided both in AMSL and bgl. A scientific diagram may also be provided for the same.</p>	Site Salient features are given in Chapter 2 and Section 2.4, Table 2-1.
31.	<p>A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation already done should be given. The plant species selected for greenbelt should have greater ecological value and should be of good utility value to local population with emphasis on local and native species and the species which are tolerant to pollution.</p>	Green Belt Development plan is proposed for 0.12.5Ha. Details given in Chapter 4, Section 4.11 & Green belt photos are given in Figure 2-8.
32.	<p>Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as a result of the</p>	The Granite dimensional blocks are transported to consumer directly as per buyer's requirement. The granite is being transported through existing road by tippers and approximate number of trips required is 2 times per week. This minimum trip does not create impact on existing transportation.



S.No	ToR Point	Compliance
	project in the present road network (including those outside the project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as state government) should be covered. Project proponent shall conduct impact of Transportation study as per Indian Road Congress Guidelines.	Impacts and mitigation measures on transportation is given in Chapter 4, Section 4.3.
33.	Details of the onsite shelter and facilities to be provided to the mines workers should be included in the EIA Report.	Sanitation facilities are provided to employees
34.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Conceptual post mining land use and Reclamation and restoration sectional plates are given in Mining Plan followed by Scheme of mining.
35.	Occupational Health impacts of the project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts & preventive measures detail given in Chapter 4 and Section 4.12. The EMP details are given as separately as Chapter 10 along with EMP Cost details.
36.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial	Occupational Health impacts & preventive measures detail given in Chapter 4 and Section 4.12. The EMP details are given as a separately as Chapter 10 along with EMP Cost details.



S.No	ToR Point	Compliance																											
	measures should be detailed along with budgetary allocations.																												
37.	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Impacts and measures are addressed in Chapter 4 and Section 4.13 .																											
38.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	The EMP details are given as a separately as Chapter 10 along with EMP Cost details.																											
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The proposed project is categorized 'B' category as per EIA Notification 2006; As per MoEF & CC Office Memorandum, dated 3 rd June 2009; EIA Notification, 2006 exempted from undertaking public hearing in existing projects.																											
40.	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the project should be given.	There is no litigation pending against the project.																											
41.	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	<p>The project Cost is addressed in Chapter 2 and Section 2.8.</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Description of the Cost</th> <th>Cost in Lakhs</th> </tr> </thead> <tbody> <tr> <td colspan="3">I. Fixed Asset Cost</td> </tr> <tr> <td>1.</td> <td>Land Cost</td> <td>Nil because of Govt. Land</td> </tr> <tr> <td>2.</td> <td>Labours Shed</td> <td>50,000/-</td> </tr> <tr> <td>3.</td> <td>Sanitary facilities</td> <td>50,000/-</td> </tr> <tr> <td>4.</td> <td>Fencing Cost</td> <td>1,25,000/-</td> </tr> <tr> <td colspan="2" style="text-align: right;">Sub Total</td> <td>2,25,000/-</td> </tr> <tr> <td colspan="3">II. Operational cost</td> </tr> <tr> <td>1.</td> <td>Jack Hammers (6 nos)</td> <td>1,98,000/-</td> </tr> </tbody> </table>	S.No	Description of the Cost	Cost in Lakhs	I. Fixed Asset Cost			1.	Land Cost	Nil because of Govt. Land	2.	Labours Shed	50,000/-	3.	Sanitary facilities	50,000/-	4.	Fencing Cost	1,25,000/-	Sub Total		2,25,000/-	II. Operational cost			1.	Jack Hammers (6 nos)	1,98,000/-
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42.	A Disaster management Plan shall be prepared and included in the EIA/EMP report.	Disaster Management Plan is given in Chapter 7 and Section 7.1.7.																																																				
43.	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the project shall clearly indicate environmental, social, economic, employment potential, etc.	<p>The project benefits are:</p> <ul style="list-style-type: none"> ➤ The quarrying activities in this belt will benefit to the local people both directly 30 and indirectly 20 persons. ➤ The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers. ➤ Improvement in Per Capita Income. ➤ The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters. ➤ It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses. <p>Project benefits are given in Chapter 8.</p>																																																				
44.	Besides the above, the below mentioned general points are also to be followed:																																																					



S.No	ToR Point	Compliance
a)	Executive Summary of the EIA/EMP report.	Executive Summary of EIA Report is given as separate book let.
b)	All documents to be properly referenced with index and continuous page numbering.	All documents addressed with properly referenced with index and continuous page numbers.
c)	Where data are presented in the report especially in Tables, the period in which the data were collected and the sources should be indicated.	Yes, sources for all tables are addressed.
d)	Project Proponent shall enclose all the analysis/testing reports of Water, Soil, Air, Noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	All the analysis/testing reports of Water, Soil, Air, Noise etc. are conducted by MoEF&CC &NABL accredited laboratories. The disclosure of Consultant is given in Chapter 12 .
e)	Where the documents provided are in a language other than English, an English translation should be provided.	The total document is prepared in English only.
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the ministry shall also be filled and submitted.	SEIAA-TN additional information for considering EC for mining projects Annexure –I will be provided in Final EIA report.
g)	While preparing the EIA report, the instructions for the Proponents and instructions for the consultants issued by MoEF&CC vide O.M No. J-11013/41/2006-IA.II (I) dated 4 th August, 2009, which are available on the website of this Ministry, should be followed.	Yes, EIA Prepared as per generic structure prescribed in Appendix –III of EIA Notification 2006 and covered the all ToR Compliance.
h)	Changes if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have	There are no Changes in prepared EIA as per submitted Form-I and PFR.

S.No	ToR Point	Compliance
	to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H process) will entail conducting the PH again with the revised documentation.	
i)	As per the circular no J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the condition stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not Applicable, as it is a new project
j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All Sectional Plates of Quarry are given in Revised Modified Scheme of Mining –I in Annexure - III .

1.13.2 In addition to the above the following shall be furnished:

The executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on the following point:

S.No	ToR Point	Compliance
1.	Project name and location (Village, District, State, Industrial Estate (if applicable)).	The same has been complied in the Executive Summary.
2.	Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous waste.	The gaseous emission, liquid effluent and solid and hazardous wastes are discussed in Chapter 4 .
3.	Measures for mitigation the impacts on the environment and mode of discharge or	The Mine waste in the mine includes the over burden, side burden, rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated



	disposal	during development works as approach road formation, formation of dumping yard sites etc., During the first five years of Mining Plan period, such waste material are proposed to be dumped along the Southern part of the lease area where it comprises of country rock terrain. No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. Septic tank will be cleaned periodically.
4.	Capital cost of the project, estimated time of completion.	Cost of the project is Rs.99,97,000/-
5.	The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity	Contour map is shown in Chapter 3, Section 3.5.5, Figure 3.10
6.	A detailed study of the lithology of the mining lease area shall be furnished	Lithology details are provided in Mining plan. Mining Plan is enclosed as Annexure-4.
7.	Detailed of village map” A” register and FMB sketch shall be furnished	Village map is shown in Chapter 2, Figure 2.9
8.	Detailed mining closure plan for the proposed projects approved by the Geology of Mining department shall be shall be submitted along with EIA report	Mine closure plan is discussed in Chapter 7, Section 7.2.4
9.	Obtain a letter/certificate from the Assisstant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report	Noted and is followed
10.	EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010	EIA report is prepared as per Environemntal Impact Assesement Guidance Manual.
11.	Details plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.	There will be no reclamation and restoration. It is proposed not to fill back the ultimate pit, in as much as good quantity of reserve is available below the workable depth.

12.	The EIA study report shall include the surrounding mining activity, if any.	There is no mining activity around the Proposed project site.																																																
13.	Modelling study for Air, Water and Noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures	AERMOD Software Version 8.0.5 is used for the modeling study of air and noise. The details are discussed in Chapter 4 .																																																
14.	A study on the geological resources available shall be carried out and reported	<table border="1"> <thead> <tr> <th>S. No</th> <th>Description</th> <th>Quantity (m3)</th> </tr> </thead> <tbody> <tr> <td colspan="3">Geological Reserves:(Black Granite)</td> </tr> <tr> <td>1</td> <td>Geological Reserves (ROM)</td> <td>7,95,808</td> </tr> <tr> <td>2</td> <td>Geological Reserves (at 10% Recovery)</td> <td>79,581</td> </tr> <tr> <td colspan="3">Mineable Reserves:</td> </tr> <tr> <td>1</td> <td>Mineable Reserves (ROM)</td> <td>6,16,994</td> </tr> <tr> <td>2</td> <td>Mineable Reserves (at 10 % Recovery)</td> <td>61,699</td> </tr> <tr> <td>3</td> <td>The peak/maximum annual production per year would be</td> <td>3,253</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>S. No</th> <th>Description</th> <th>Quantity (m3)</th> </tr> </thead> <tbody> <tr> <td colspan="3">Geological Reserves:(Granitic Gneiss)</td> </tr> <tr> <td>1</td> <td>Geological Reserves (ROM)</td> <td>41,45,783</td> </tr> <tr> <td>2</td> <td>Geological Reserves (at 100% Recovery)</td> <td>41,45,783</td> </tr> <tr> <td colspan="3">Mineable Reserves:</td> </tr> <tr> <td>1</td> <td>Mineable Reserves (ROM)</td> <td>28,66,968</td> </tr> <tr> <td>2</td> <td>Mineable Reserves (at 100 % Recovery)</td> <td>28,66,968</td> </tr> <tr> <td>3</td> <td>The peak/maximum annual production per year would be</td> <td>4,71,221</td> </tr> </tbody> </table>	S. No	Description	Quantity (m3)	Geological Reserves:(Black Granite)			1	Geological Reserves (ROM)	7,95,808	2	Geological Reserves (at 10% Recovery)	79,581	Mineable Reserves:			1	Mineable Reserves (ROM)	6,16,994	2	Mineable Reserves (at 10 % Recovery)	61,699	3	The peak/maximum annual production per year would be	3,253	S. No	Description	Quantity (m3)	Geological Reserves:(Granitic Gneiss)			1	Geological Reserves (ROM)	41,45,783	2	Geological Reserves (at 100% Recovery)	41,45,783	Mineable Reserves:			1	Mineable Reserves (ROM)	28,66,968	2	Mineable Reserves (at 100 % Recovery)	28,66,968	3	The peak/maximum annual production per year would be	4,71,221
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15.	A specific study on agriculture and livelihood shall be carried out and reported	The details of agriculture & Livelihood is discussed in Chapter 3, Section 3.12																																																
16.	Impact of soil erosion, soil physical chemical and biological property changes may be assumed	The quality of soil is discussed in Chapter 3, Section 3.10																																																
17.	Site selected for the project-Nature of land Agricultural (single/double crop), barren, Govt./private land, status of is acquisition, nearby (in 2-3km) water body, population, with in 10km other industries, forest, eco-sensitive zones, accessibility, (note-incase if	The details are discussed in Chapter 3, Section 3.2, Table 3.1																																																



	industrial estate this information may not be necessary)	
18.	Baseline environmental data-air quality, surface and ground water quality and soil characteristic, flora and fauna, socio economic conditions of the nearby population.	Baseline environmental data-air quality, surface and ground water quality and soil characteristic, flora and fauna, socio economic conditions of the nearby population are discussed in Chapter 3.
19.	Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	3.0 litres/year of waste oil is generated from the mining activity. The waste oil will be collected in leak proof containers and disposed to TNPCB Authorized Agencies for Reprocessing/ Recycling.
20.	Likely impact of the project on Air, Water, Land, flora and fauna and nearby population.	The impacts of the project on Air, Water, Land, flora and fauna are discussed in Chapter 4
21.	Emergency preparedness plan in case of natural or in case of plant emergencies.	The emergency preparedness plan is discussed in Chapter 7, Section 7.2.3
22.	Issues raised during public hearing (if applicable) and response giving.	The public hearing minutes and compliance will be discussed in Chapter 7, Section 7.1 and Table 7.1 after completion of Public Hearing
23.	CER plan with proposed expenditure.	CER Activity will be implemented for an amount of Rs.1,99,940 (2% of Project Cost) as per MoEF&CC O.M dated 20 th October, 2020 (F.No. 22-65/2017-IA.III)
24.	Occupational Health Measures.	Occupational Health impacts & preventive measures detail given in Chapter 4, Section 4.7.3 and Table 4.28
25.	Post project monitoring plan.	Post project monitoring plan is discussed in Chapter 3, Section 6.3
26.	The project proponent shall carry out detailed hydro geological study through institutions/NABET Accredited agencies.	The Proposed depth the quarry is 30m AGL of a hill of 45m and the ground water is in 35m. So there will be no impact on the Ground water.Also there are no major surface water bodies in the surrounding the project area.
27.	A detailed report on the greenbelt development already undertaken is to be furnished and also submit the proposal for greenbelt activities	As proposed, 30 plants per year were planted during the mining Period along the eastern boundary of lease area and achieved survival rate of 50%. The project proponent will spend Rs.30,000/- for the afforestation.
28.	The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines	The control measures to control the fugitive emissions during the operations of the mines is discussed in Chapter 4, Section 4.2, Table 4.3
29.	A specific study should include impact on flora and fauna, disturbance to migratory	Flora and Fauna study is discussed in Chapter 3, Section 3.11



	pattern of animals	
30.	Reserve funds should be earmarked for proper closure plan	Reserve Funds will be earmarked while mining activity.
31.	A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and Forests (EC.2) Department dated 25.06.2018 regarding ban on time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.	A sustainable plastic waste management plan by installing bins for collection/Segregation of recycleable and non-recyclable plastic waste at the proposed project site will be implemented.

1.13.3 Besides the above the below mentioned general points should also be followed:

S.No	ToR Point	Compliance
a.	A note containing compliance of the ToR with cross referencing of the relevant sections/pages of the EIA report should be provided.	Compliance of the ToR with cross referencing of the relevant sections/pages of the EIA report is provided in Chapter 1, Section 1.13
b.	All documents mat be properly referenced with index, page number and continuous page numbering.	All documents are properly referenced with index, page number.
c.	Where data are present in the report especially in table, the period in which the data where were collected and the sources should be indicated.	The sources are mentioned in the table. The period and locations of water, air, noise and soil samples collected from the site are discussed in Chapter 3.
d.	While preparing the EIA report, the instructions for the proponents and instruction for the consultant issued by the MoEF vide OM no. J-11013/41/2006-IA.II(I) dated 4 th August 2009 which are available on the website of the ministry should also be followed.	Noted
e.	The consultants involved in the preparation of EIA/EMP report after accreditation with quality council of India (QCI)/National Accreditation board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organizations/laboratories including the status of the approvals etc. in this	EIA Report is prepared by NABET accredited Consultant, The Consultancy Laboratory is certified by MoEF&CC and NABL accredited. The disclosure of Consultant is given in Chapter 12.



regards circular no. F.No.J-11013/77/2004-IA-II(I) dated 2 nd December, 2009, 18 th March 2010 , 28 th may 2010, 28 th June 2010, 31 st December 2010 and 30 th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.	
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After preparing the EIA (as per the generic structure prescribed in Appendix III of the EIA notification 2006) covering the above mentioned points, the proponent will take necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA notification 2006.

- The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
- The ToR's prescribed shall be valid for a period of 3 years from the date of issue for the submission of the EIA/EMP report as per O. M No. J-11013/41/2006/IA-II(I) (part) dated 29th August 2017.
- The receipt of this letter may be acknowledged.



2 PROJECT DESCRIPTION

2.1 Type of project including interlinked and interdependent projects

Black Granite

The black granite quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & 6 m width with vertical slopes. The area applied for quarry lease exhibits hilly terrain; the altitude of the area is above (~652-703) AMSL. Total estimated Geological reserves are 7,95,808 m³. By applying 10% recovery reserves arrived as 79,581m³. Total Mineable Reserves is estimated as 6,16,994 m³. By applying 10% recovery Mineable reserves arrived as 61,699m³. Maximum production will be 3,253 m³. Total proposed ROM of Black Granite is 1,62,533 m³. By applying 10% recovery it is arrived as 16,253m³. Summary of quarry reserves are given in **Table 2-1**.

Quartzo Feldspathic Gneiss

The Quartzo Feldspathic Gneiss quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 10m & 10 m width with vertical slopes. The area applied for quarry lease exhibits hilly terrain; the altitude of the area is above (~652-753) AMSL. Total estimated Geological reserves are 41,45,783 m³. By applying 100% recovery. Total Mineable Reserves is estimated as 28,66,968m³. Maximum production will be 20,18,784m³. Summary of quarry reserves are given in **Table 2-1**.

The extent of the Quarry lease area is 40.13.05 Ha. The Quarry is located at Panchapaali & Namandahalli village, Palacode taluk, Dharmapuri District, Tamilnadu State. Quarry lease area falls in the survey of India Toposheet no 57L/2,3 & 57H/14,15 and the area lies in the Eastern Longitude from 77°57'32.69"E to 77°57'59.54"E and Northern latitude from 12°28'33.38"N to 12°28'53.66"N.

Table 2-1 Summary of Project Reserves (Black Granite)

S. No	Description	Quantity (m ³)
Geological Reserves:		
1	Geological Reserves (ROM)	7,95,808
2	Geological Reserves (at 10% Recovery)	79,581
Mineable Reserves:		
1	Mineable Reserves (ROM)	6,16,994
2	Mineable Reserves (at 10 % Recovery)	61,699
3	The peak/maximum annual production per year would be	3,253

Table 2-2 Summary of Project Reserves(Quartzo Feldspathic Gneiss)

S. No	Description	Quantity (m ³)
Geological Reserves:		
1	Geological Reserves (ROM)	41,45,783
2	Geological Reserves (at 100% Recovery)	41,45,783
Mineable Reserves:		
1	Mineable Reserves (ROM)	4,71,221
2	Mineable Reserves (at 100 % Recovery)	4,71,221
3	The peak/maximum annual production per year would be	4,71,221

2.2 Need for the Project

Black Granite

The granite dimensional stone material by virtue of its pleasing color and texture and its best ability to take polishing and appealing look in polished product has attracted the consumers in the building construction and interior decoration industries. The domestic market capabilities have also been explored in recent periods. Bulk quantity of the blocks is produced and exported as raw blocks and some quantity is being processed at TAMIN's granite processing units and exported as value added finished products.

The earning source in the targeted area is limited, most of the people in and around the area depend upon the seasonal agriculture and much of the people migrate to nearby towns where good industries and factories are growing up.

This project will provide direct employment for about 35 persons. This material is well known in the international supermarket of Granite which will fetch a good foreign exchange to the nation.

Quartzo-Feldspathic Gneiss

The country rock (Quartzo-Feldspathic Gneiss) is being excavated as is where is condition and transported to the M-sand unit for making of M-sand. The finished M-sand material can be used for all civil constructions projects as alternate for river sand.

2.3 Quarry Location

The black granite&granitic gneiss mine is over an extent of 16.54.0 ha located in S.F.No.287 (Panchapalli) and 19 (Namandahalli), located at Panchapalli&Namandahalli Village, Palacode Taluk, Dharmapuri District, lies in the latitude of 12°28'33.38" N to 12°28'53.66" N and longitude of 77°57'32.69" E to 77°57'59.54" E. The area is marked in the survey of India Topo sheet No.57L/2,3 and 57H/14,15. Site Elevation is above 652m – 703m AMSL. The boundary Coordinates of the site given in **Table 1.1**. The project location map is given in **Figure 2.1**. Google Imagery of the lease area boundary is given in **Figure 2.2**. 300 m& 500m Radius Google Imagery of the project site is given in **Figure 2.3**.500m radius village map of the project site is shown in **Figure 2.4**. Topo map of the study

area is given in **Figure 2.5**. Environmental sensitive areas covering within 15 km from project boundary is given in **Figure 2.6**. Project Connectivity & Green Belt photos are shown in **Figure 2.7**. Quarry Lease area Photos are shown in **Figure 2.8**. Existing quarry pit & dump area Photographs are given in **Figure 2.9**.

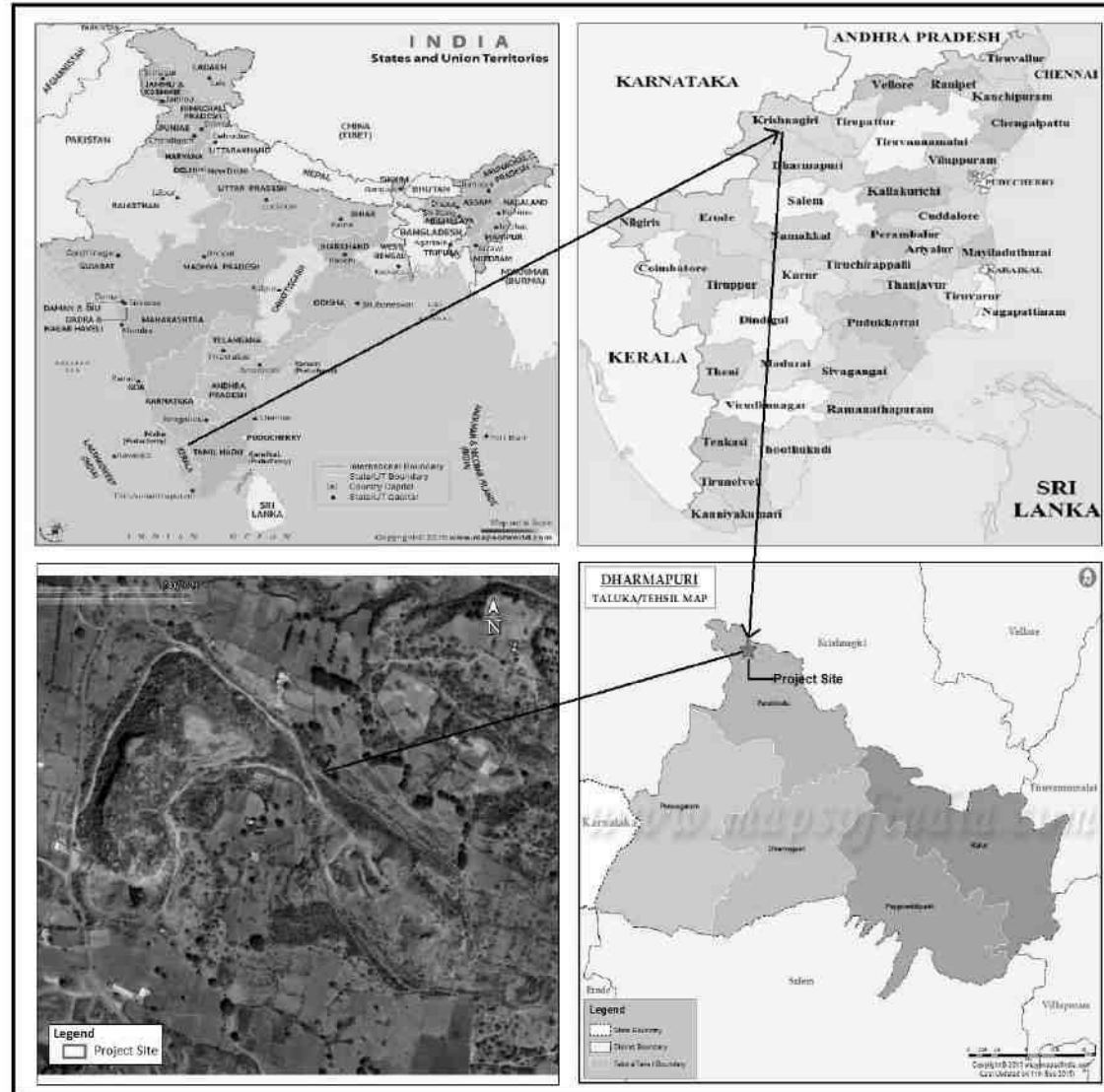


Figure 2-1 Project Location Map



Figure 2-2 300 m Google Imagery of the lease area boundary



Figure 2-3 500m Radius Google Imagery of the project site

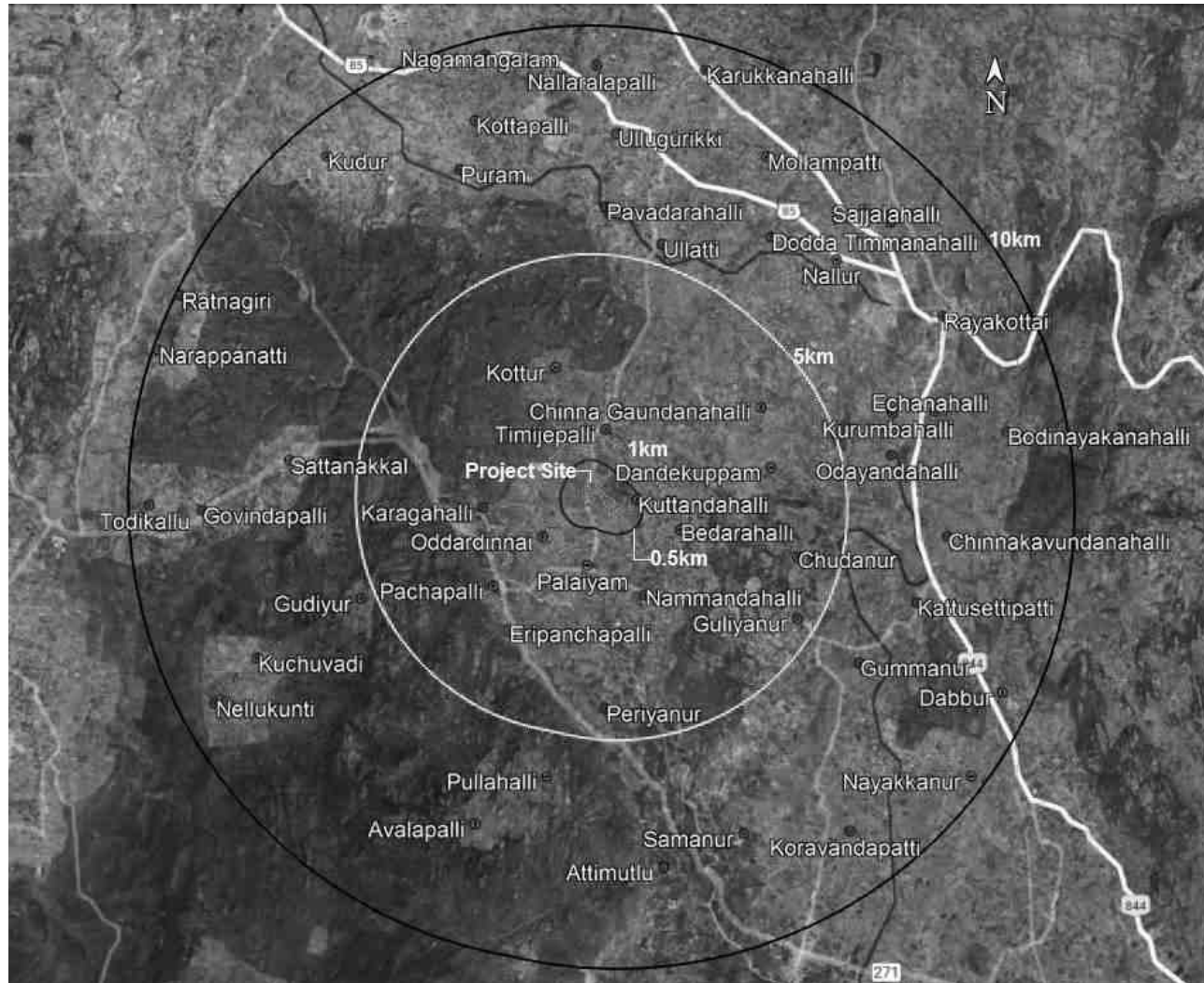


Figure 2-4 10km radius Google Imagery of the project site

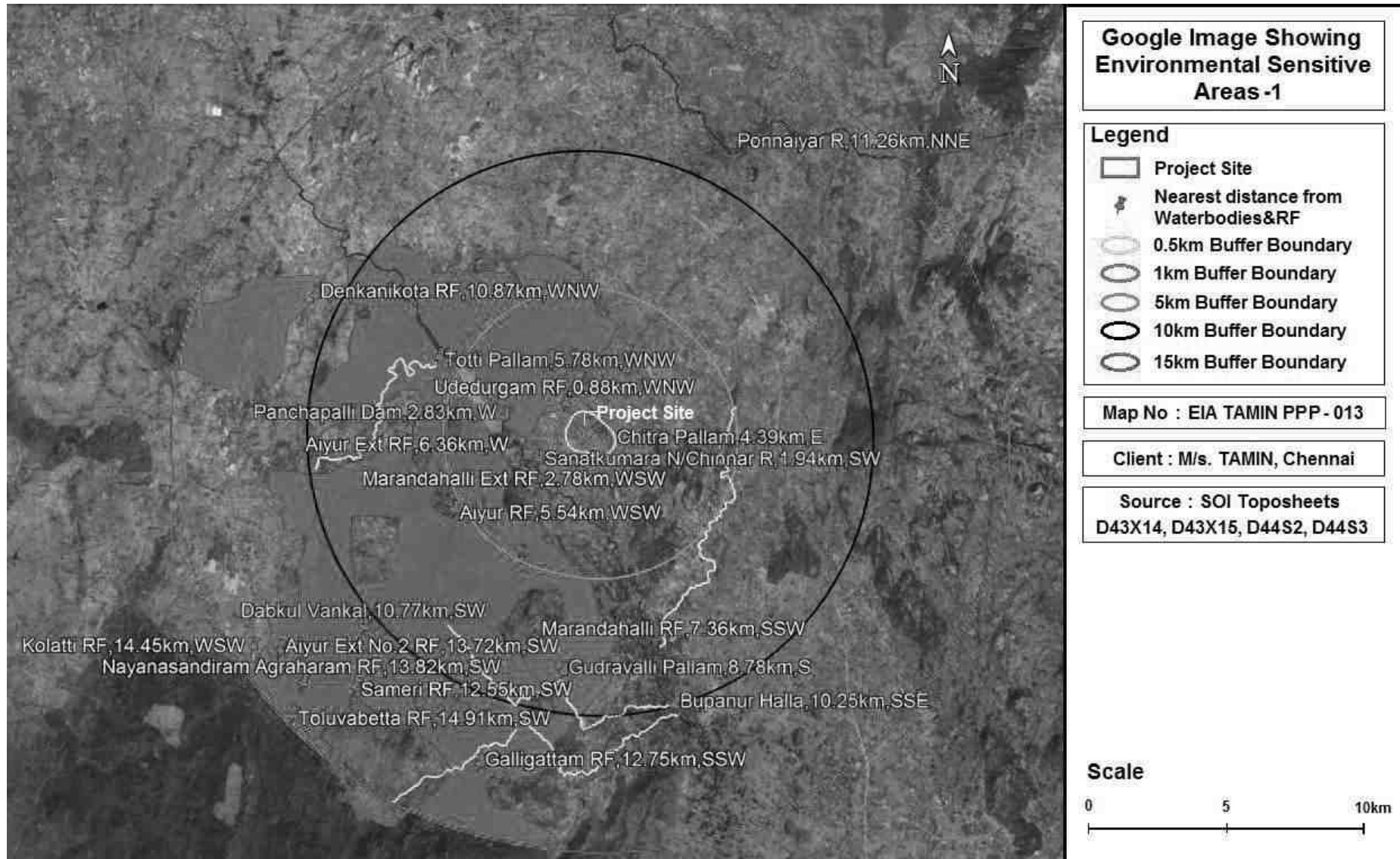


Figure 2-6 (a) Google image showing Environmental sensitive areas covering within 15 km from project boundary

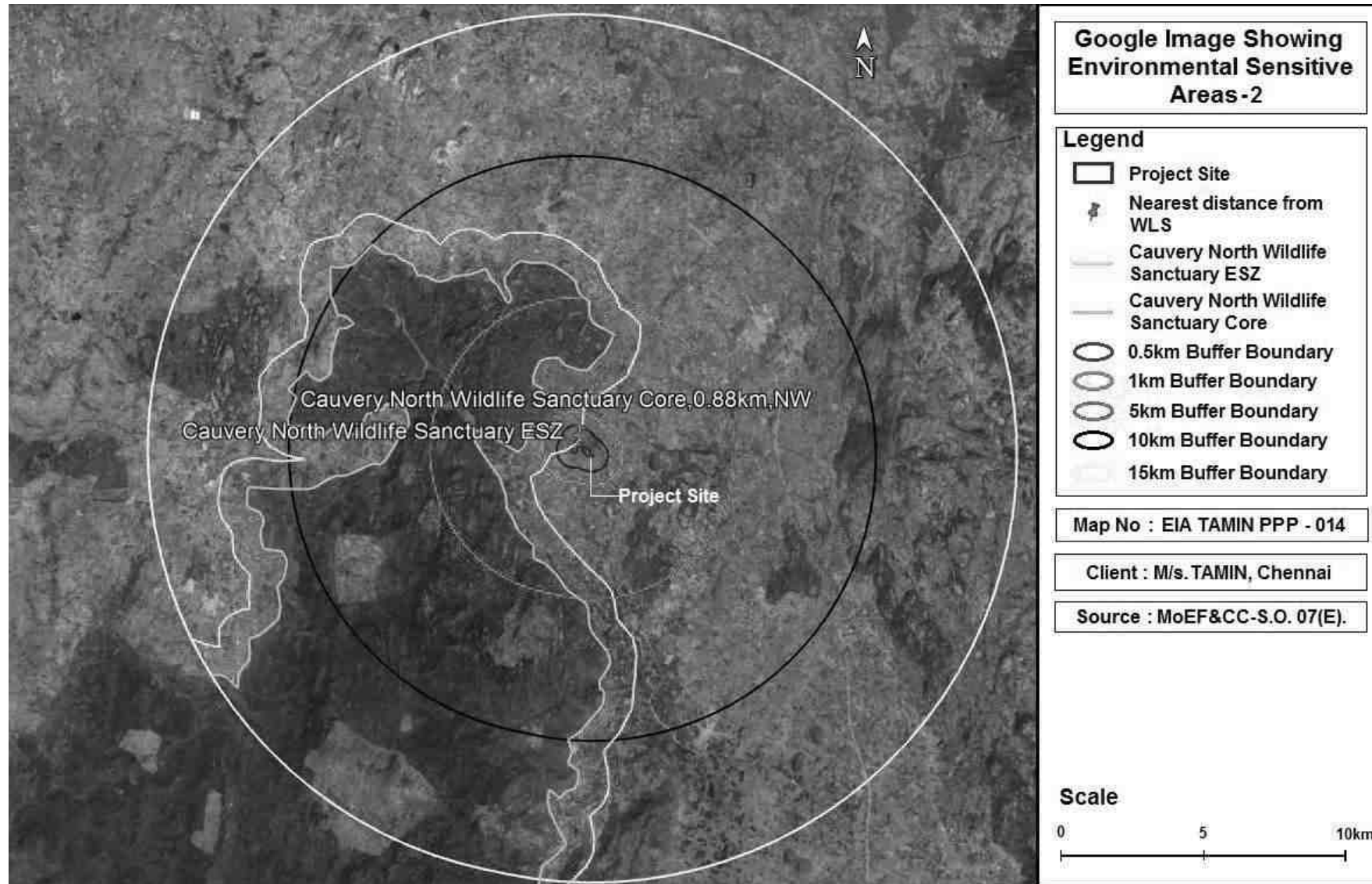


Figure 2-7 (b) Google image showing Environmental sensitive areas covering within 15 km from project boundary

2.4 Project Summary & Salient Features

Project Summary & Salient Features within 15km radius of the project boundary is shown in **Table 2-3**.

Table 2-3 Project Summary & Salient Features within 15km radius of the lease area boundary

S. No	Particulars	Details			
1.	Latitude	77°57'32.69" E to 77°57'59.54" E			
2.	Longitude	12°28'33.38" N to 12°28'53.66" N			
3.	Site Elevation above MSL	652-703 m AMSL			
4.	Topography	Hilly terrain			
5.	Land use of the site	Government land			
6.	Extent of lease area	16.54.0			
7.	Quarry Lease (G. O.(3D)No.51)	30 Years from 16.02.2012 to 15.02.2042.			
8.	Water Requirement	1.5 KLD			
9.	Power requirement through DG Set	60 (DG Set 1*125 kVA)			
10.	Fuel requirements (Lts/Day)	200			
11.	Manpower	Direct-30 & Indirect -20			
12.	Municipal Solid waste Generation (Kg /day)	16			
13.	Waste Oil generation (Lts/Y)	3.0			
14.	Project Cost in Lakh	99.97			
15.	Nearest highway	<ul style="list-style-type: none"> ➤ NH-844(Hosur-Dharmapuri) ~6.42km (E) ➤ SH-85(Rayakottai – Mathigiri) ~6.94km (NNE) 			
16.	Nearest railway station	Rajakkottai Railway Station ≈7.65 km (NE)			
17.	Nearest airport	Bengaluru Airport ≈ 81.44km (NNW)			
18.	Nearest town / city	Nearest Town: Rajakkottai≈7.46km (NE) Nearest City: Krishnagiri≈24km (E)			
19.	Water body	S. No	Water bodies	Distance (km)	Direction
		1.	Sanatkumara N/Chinnar R	1.94	SW
		2.	Eripanchapalli Lake	2.47	SSW
		3.	Panchapalli Dam	2.83	W
		4.	Chitra Pallam	4.39	E
		5.	Dhul Chetti Lake	4.78	ENE
		6.	Totti Pallam	5.78	WNW
		7.	Gudravalli Pallam	8.78	S
		8.	Nagamangalam Lake	9.03	NNW
		9.	Bupanur Halla	10.25	SSE
		10.	Lake near Sengodachinnahalli	10.57	NNE
		11.	Dabkul Vankal	10.77	SW
		12.	Ponnaiyar R	11.26	NNE
20.	Hills / valleys	Nil in 15 km radius			
21.	Archaeologically places	Nil in 15 km radius			
22.	National parks / Wildlife Sanctuaries	S. No	Wild life Sanctuary	Distance (~km)	Direction
		1.	Cauvery North Wildlife Sanctuary ESZ	Crossing the Site	
		2.	Cauvery North Wildlife	0.88	NW

		Sanctuary Core			
		S. No	Reserve Forests	Distance (km)	Direction
23.	Reserved / Protected Forests	1.	Udedurgam RF	0.88	WNW
		2.	Marandahalli Ext RF	2.78	WSW
		3.	Aiyur RF	5.54	WSW
		4.	Aiyur Ext RF	6.36	W
		5.	Marandahalli RF	7.36	SSW
		6.	Denkanikota RF	10.87	WNW
		7.	Sameri RF	12.55	SW
		8.	Galligattam RF	12.75	SSW
		9.	Aiyur Ext No.2 RF	13.72	SW
		10.	Nayanasandiram Agraharam RF	13.82	SW
		11.	Kolatti RF	14.45	WSW
		12.	Toluvabetta RF	14.91	SW
24.	Seismicity	Seismic zone-II & III			
25.	State Boundary	Nil			

2.4.1 Nearest Human Settlement

The details of nearest human settlement from the project Site are provided below **Table 2-4**.

Table 2-4 Nearest Human Settlement

S.No	Name of the Village	Distance (km)	Direction	Population (Census 2011)
1	Kuttandahalli	0.42	E	500
2	Gangapalayam	0.62	S	400
3	Oddardinnai	1.05	SW	250
4	Palaiyam	1.09	S	1,000
5	Timijepalli	1.11	N	4,425

2.5 Details of alternate sites considered

There is no alternative sites examined, The entire Black Granite & Granitic Gneis Bulk quantity of the blocks are produced and exported as raw blocks and is being processed at TAMIN's Granite processing units and exported as value added finished products.

2.6 Size or magnitude of operation

The black granite and granitic gneiss mine is over an extent of 16.54.0ha located in S.F.No.287 (Panchapalli) and 19(Namandahalli), located at Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, lies in the latitude of 12°28'33.38" N to 12°28'53.66" N and longitude of 77°57'32.69" E to 77°57'59.54" E. The area is marked in the survey of India Topo sheet No.57L/2, 3 and 57H/14, 15.

The black granite quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & width bench not less than the

height. Proposed black granite production of mine is 3,253m³ with a depth of Mining of 30m from the top of the hillock for the period of 30 years and Proposed granitic gneiss production of mine is 4,71,221m³ with a depth of Mining of 30m from the top of the hillock for the period of 30 years.

The area applied for quarry lease is exhibits hilly terrain; the altitude of the area is 652m-703m AMSL. The Land Use Break up summarized as

Table 2-5.

Table 2-5 Land use Pattern of the quarry area

S. No.	Description	Present Area (Ha.)	Area to be required at the present Scheme Period (Ha.)	Area at the end of life of Quarry (Ha.)
1.	Area under Quarrying	2.26.0	10.40.5	13.35.0
2.	Waste Dump	3.23.5	2.65.0(including Afforestation 0.06.5)	2.65.0(including afforestation 0.50.0)
3.	Infrastructure	0.02.5	0.02.5	0.01.5
4.	Roads	0.07.0	0.07.0	0.07.0
5.	Mine approach roads	1.39.0	0.30.0	0.03.5
5.	Green Belt	0.12.5	Over waste dump	Over waste dump
6.	Unutilized	9.43.5	3.09.0	0.42.0
Total		16.54.0	16.54.0	16.54.0

2.6.1 Black Granite Reserves

The available mineable reserve calculated by deducting 7.5m safety distance and bench loss. The updated geological reserves of black granite estimated based on the geological cross-sections was 7,95,808m³ as on 30.09.2021 by deleting the reserves depleted, during the mining plan period from (2012-2017) and during the modified scheme of mining-1 (2017 to 2022). By applying the 10% recovery, the updated geological effective reserve as 79,581m³.

The updated mineable reserves for black granite have been arrived as 6,16,994m³ as on 30.09.2021 after consideration of mineral locked-up in benches and safety barrier. By applying 10% recovery, the updated mineable effective reserves as 61,699m³.

2.6.2 Granitic Gneiss Reserves

The available mineable reserve calculated by deducting 7.5m safety distance and bench loss. The updated geological reserves of black granite estimated based on the geological cross-sections was 41,45,788m³ as on 30.09.2021. By applying the 100% recovery, the updated geological effective reserve as 41,45,788m³.



The updated mineable reserves for black granite have been arrived as 28,66,968m³ as on 30.09.2021 after consideration of mineral locked-up in benches and safety barrier. By applying 100% recovery, the updated mineable effective reserves as 28,66,968m³.

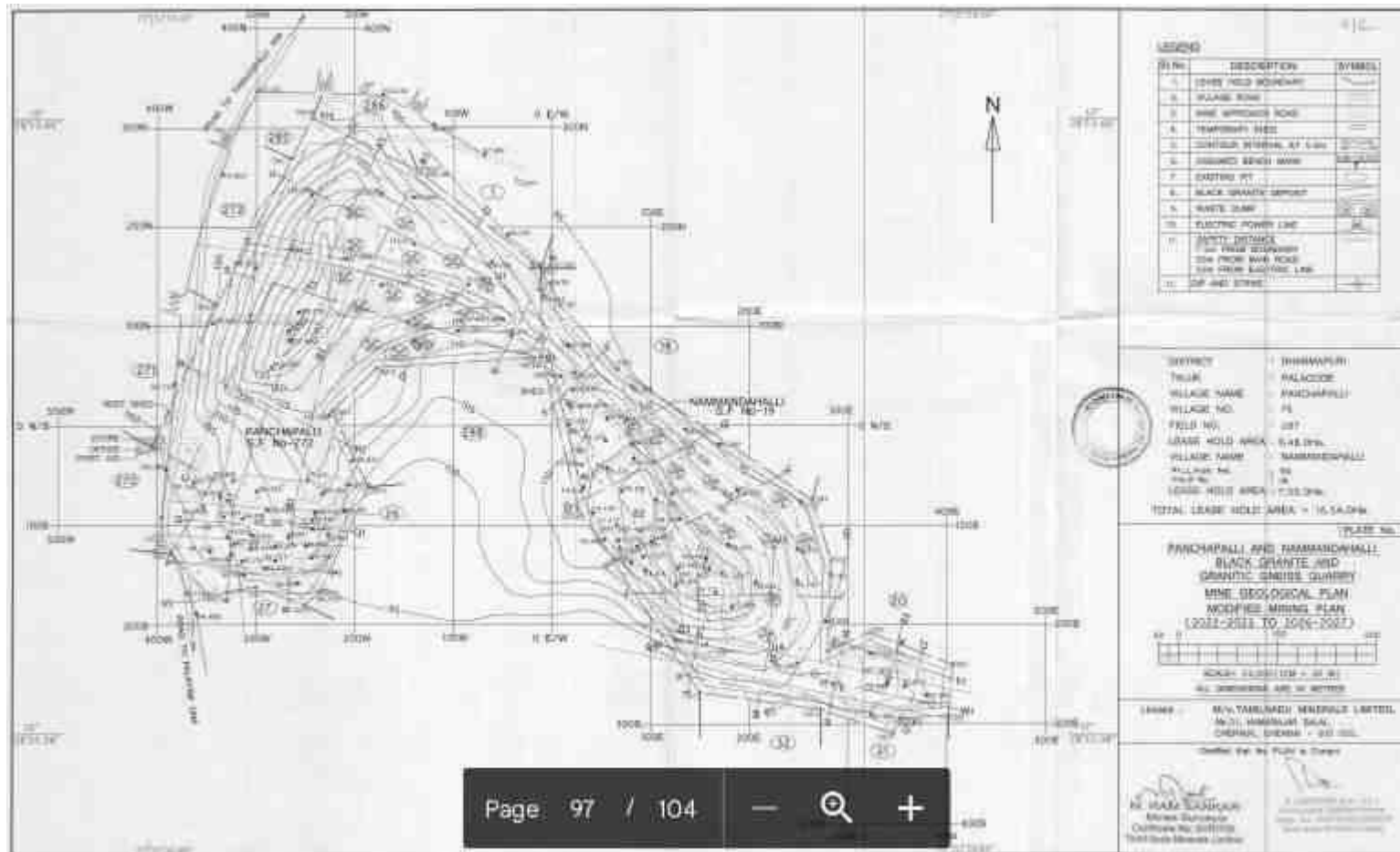


Figure 2-8 Geological Plan of the Granite Quarry

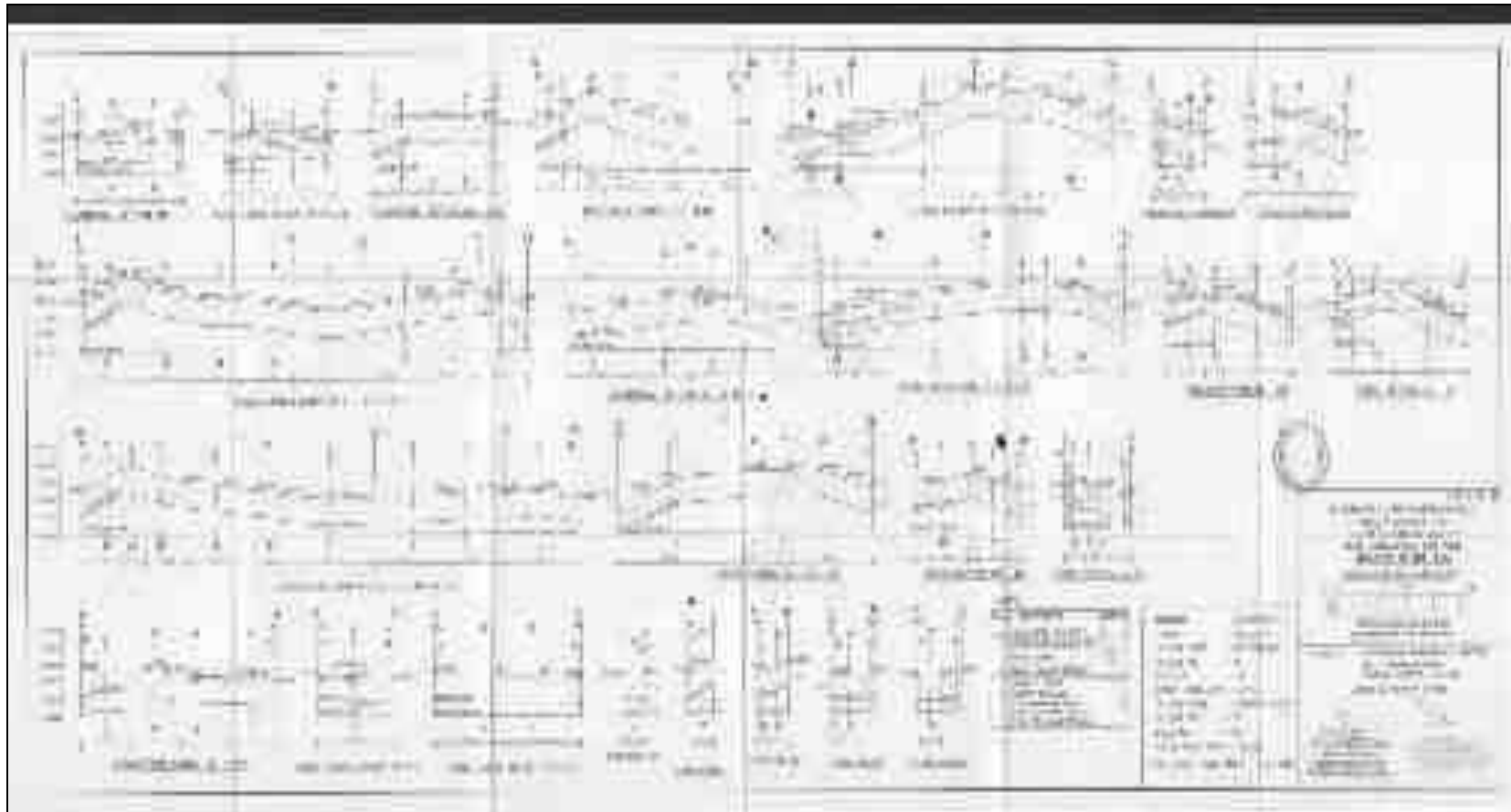


Figure 2-9 Geological Sections of the Granite Quarry

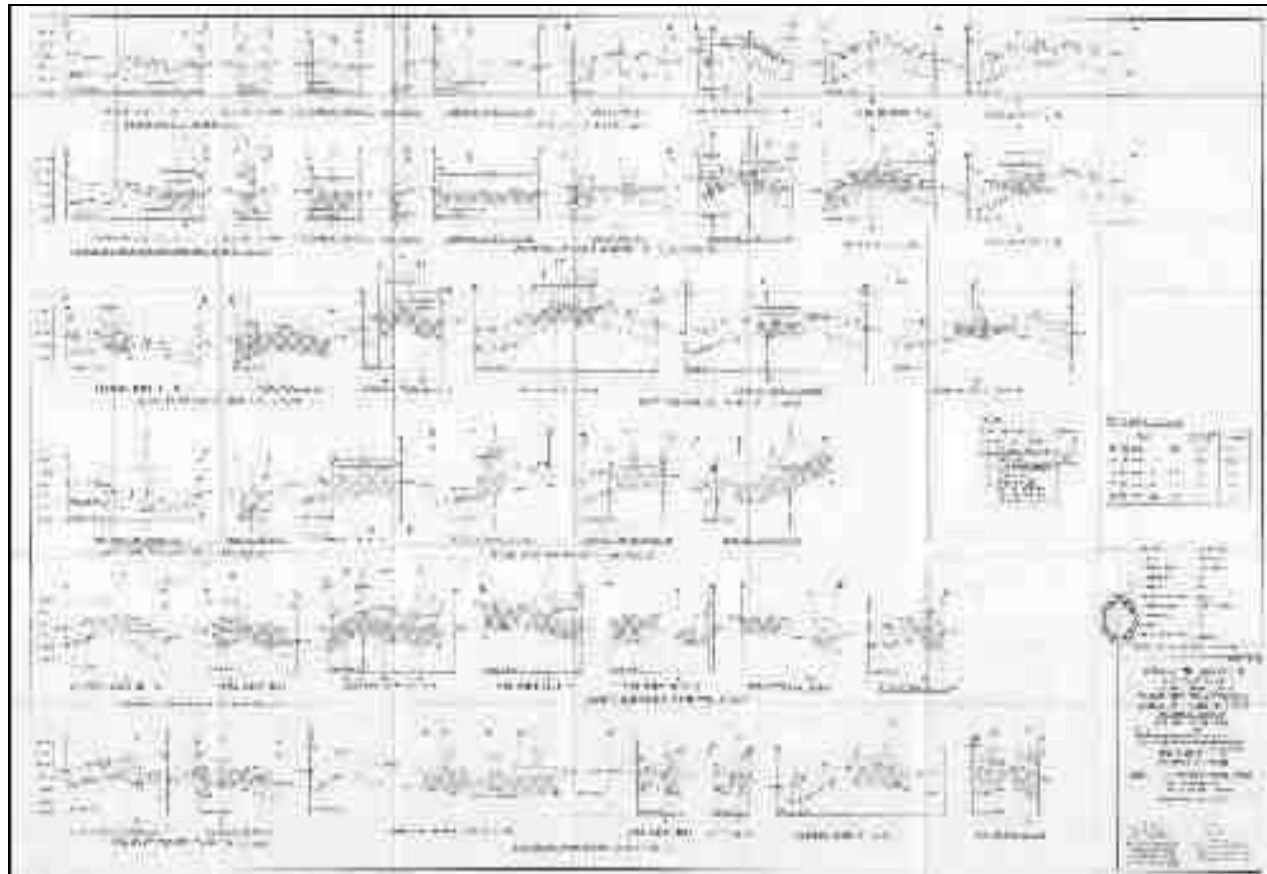


Figure 2-10 Conceptual sections of the quarry

1/2/2011

2.6.3 Depletion of Reserves

The depletion of Reserves during Mining Plan period was (2012-2017)14,603m³, and during the Modified Mining plan period (2017 to 2022) was 4,269m³. Hence, total depletion of reserves as 18,872m³.

2.6.4 Additional reserves established category wise

No additional reserves established during the Modified Scheme of Mining Period.

Table 2-6 Black Granite Updated Geological reserves as on 30.09.2021

Section	Measurements (m)			ROM (m ³)	Effective Reserves (m ³)	Granite waste (m ³)		
	Length	Width	Depth					
Q-Q1&A-A1	80	34	30	81,600				
Q-Q1&B-B1	80	34	30	81,600				
T-T1&C1C2	80	18	30	43,200				
T-T1&B2B3	78.5	15	30	35,325				
T-T1&DD'	78.5	13	30	30,615				
T-T1&EE'	80	15	30	36,000				
T1-T2&FF'	90	13	30	35,100				
T2-T3&GG'	90	14	30	37,800				
T2-T3&HH'	83	26	30	64,740				
T3-T4&JJ'	83	45	30	1,12,050				
W-W1&LL'	72	29	30	63,075				
W-W1&MM'	72	29	30	63,075				
W-W1&NN'	72	30	30	65,250				
W-W1&OO'	72	30	30	65,250				
Total Geological Reserves				8,14,680				
Depletion of reserves before mining plan period(2012 TO 2017)				(-) 14,603				
Depletion of reserves during the modified mining plan period (2017 TO 2022)				(-) 4,269				
Updated Geological Reserves as on 30.09.2021				7,95,808	79,581 @10%	7,16,227 @90%		

- Updated Geological Reserves as on 31.07.2021 - **7,95,808 m³**
- Updated Recoverable Reserves@10% as on 30.09.2021 – **79,581 m³**
- Updated Granite Waste @90% as on 30.09.2021 – **7,16,227 m³**
- ROM: Waste Ratio – **1:0.90**

Table 2-7 Updated Geological Reserves as on 30.09.2021(Granitic Gneiss)

Section	Measurements (m)			ROM (m ³)	Effective Reserves (m ³)
	Length	Width	Depth		
P-P1&A-A1	77.25	52	30	1,20,510	
P-P1&B-B1	77.25	55	30	1,27,463	
R-R1&C-C1	65	160	30	3,12,000	
R-R1&A1-A2	46	179	30	2,47,020	
R-R1&B1-B2	65	155	30	3,02,250	

S-S1&C1-C2	60	76	30	1,36,800
S-S1&A2-A3	40	78	30	93,600
S-S1&B2-B3	60	83	30	1,49,400
S-S1&DD'	80	78	30	1,87,200
S-S1&EE'	70	28	30	58,800
S1-S2&FF'	89	30	30	80,100
S1-S2&GG'	85	70	30	1,78,500
S2-S3&HH'	58	55	30	95,700
S2-S3&JJ'	65	40	30	78,000
U-U1&C1-C2	57	115	30	1,96,650
U-U1&A2-A3	40	104	30	1,24,800
U-U1&B2-B3	61	105	30	1,92,150
UI-U2&DD'	80	67	30	1,60,800
U1-U2&EE'	82.5	50	30	1,23,750
U1-U2&FF'	110	30	30	99,000
U2-U3&GG'	94.5	67	30	1,89,945
U2-U3&HH'	93.5	103	30	2,88,915
U3-U4&JJ'	111	108	30	3,59,640
V-V1&KK'	113	34	30	1,15,260
X-X1&MM'	109	22	30	71,940
X-X1&NN'	109	17	30	55,590
Total Geological Reserves				41,45,783
Depletion of reserves				NIL
Updated Geological Reserves as on 30.09.2021				41,45,783
				41,45,783@100%

- Updated Geological Reserves as on 30.09.2021 – **41,45,783 m³**
- Updated Recoverable Reserves@100% as on 30.09.2021 – **41,45,783 m³**

Table 2-8 Updated Mineable reserves as on 30.09.2021

S.No	Description	Granite(m ³)	Recovery	Granite Waste
1	Black Granite	6,16,994	61,699	5,55,295
2	Granitic Gneiss	28,66,968	28,66,968	Nil

2.7 Summary of the Magnitude of Operation

The mining plan for black granite occurring in SF.No.287 of Panchapalli village & in SF.No.19 of Namandahalli village, Palacode Taluk, Dharmapuri district was approved with 5% recovery by the Commissioner of Geology & Mining, Chennai vide Letter No.12903/MM5/2007, dated: 03.11.2011. As per Rules 18(3) of granite Conservation and Development Rules, 1999, the subsequent Scheme of Mining should be submitted within 120 days before the expiry of the five years period, for which it was approved on the last occasion. As the mining plan was approved on 03.11.2011, the subsequent Scheme of Mining-1 period was taken with effect from the last occasion of Mining plan year of 2011 and accordingly the Scheme of Mining-1 with 5% recovery for the period pertaining to 2016-2017 to 2020-2021 was prepared and submitted vide TAMIN Letter No: 6002/ML3/2016, dated:

21.06.2016 and the same was approved by the Director of Geology and Mining, vide Letter No: 6054/MM5/2018, dated: 24.08.2018.

Further, TAMIN had requested the Government to permit to produce and transport the Rough stones from the country rock of the said leased out area for making m sand under rule 36(3) of TamilNadu Minor Mineral Concession Rule, 1959 vide TAMIN'S Letter No: 709/ML2/2016 dated: 15.02.2016. Hence, TAMIN submitted the Modified Scheme of Mining-I pertaining to the years 2016-2017 to 2020-2021 for the said area with 5% recovery for Black Granite & 100% recovery for Granitic Gneiss vide this letter No: 6002/ML3/2016, dated: 26.10.2016 and it was under process by the authority concerned for approval.

Accordingly, the present Modified Mining Plan for the subject area has been prepared with 10% recovery for Dolerite and 100% recovery for Granitic Gneiss for the period from 2022-2023 to 2026-2027.

Table 2-9 Yearwise Development/ Production for the Five Years (2022-2027) Black granite

S. No	Year	ROM (m ³)	Recovery @ 10 % (m ³)	Total Waste Generation (m ³)				ROM waste ratio
				OB	SB	Granite Rejects	Total	
1	2022-2023	32,445	3,245	--	--	29,200	29,200	1:0.90
2	2023-2024	32,518	3,252	--	--	29,267	29,267	1:0.90
3	2024-2025	32,532	3,253	--	--	29,279	29,279	1:0.90
4	2025-2026	32,530	3,253	--	--	29,277	29,277	1:0.90
5	2026-2027	32,508	3,250	--	--	29,258	29,258	1:0.90
Total		1,62,533	16,253	--	--	1,46,281	1,46,281	1:0.90

➤ Total Proposed ROM: 1,62,533 m³

➤ Total Recoverable reserves @ 10%: 16,253 m³

Table 2-10 Yearwise Development/Production for the Five Years (2022-2027) Granitic Gneiss

S.No	Year	ROM (m ³)	Recovery @ 100% (m ³)	Saleble Production
1	2022-2023	4,22,957	4,22,957	4,22,957
2	2023-2024	4,71,221	4,71,221	4,71,221
3	2024-2025	3,30,654	3,30,654	3,30,654
4	2025-2026	4,46,695	4,46,695	4,46,695
5	2026-2027	3,47,257	3,47,257	3,47,257
Total		20,18,784	20,18,784	20,18,784

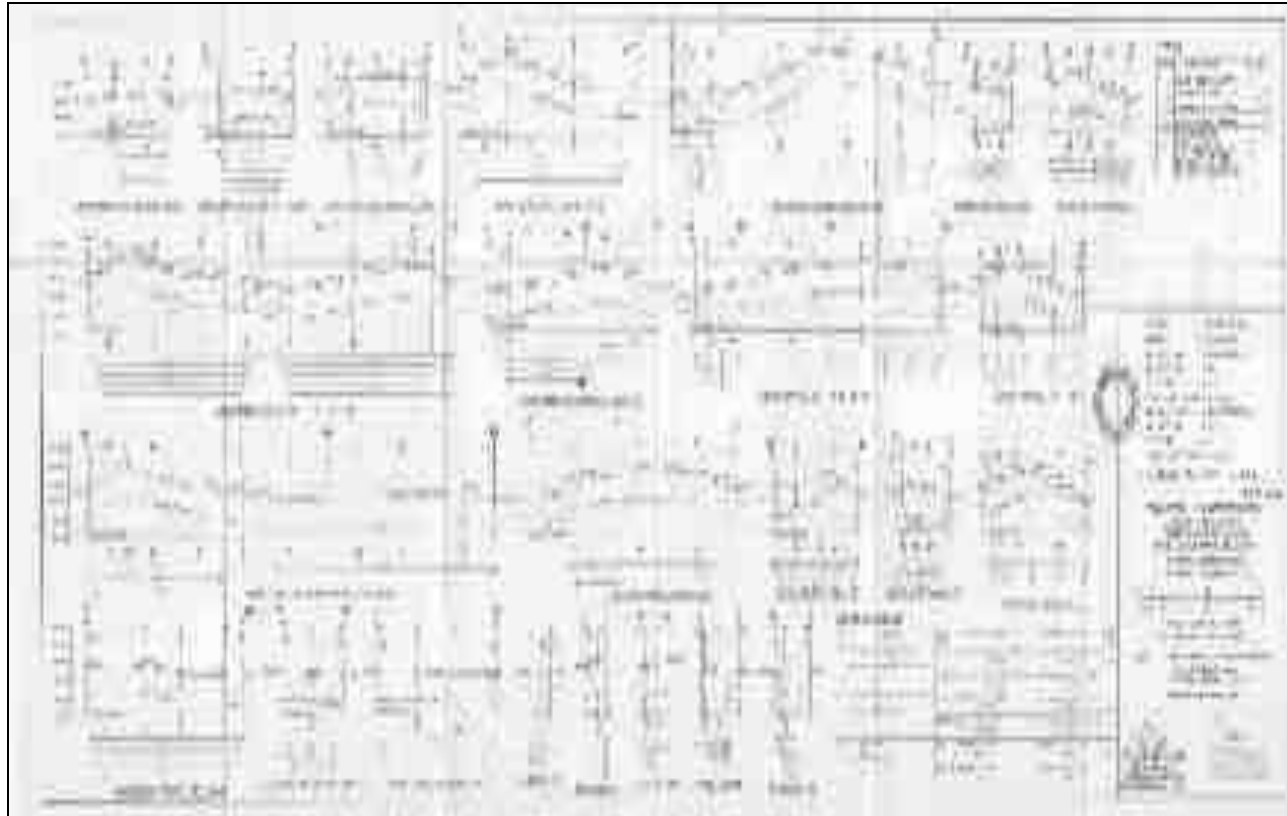


Figure 2-11 Year wise production development Plan for the Next five years (2022-2023 to 2026-2027)



2.8 Project Cost

Project cost of the project is shown in Table 2-11.

Table 2-11 Project cost of the project

S. No	Description of the Cost	Cost in Lakhs
a) Fixed Asset Cost		
1.	Land Cost	Nil because of Govt. Land
2.	Labours Shed	50,000/-
3.	Sanitary facilities	50,000/-
4.	Fencing Cost	1,25,000/-
Sub Total		2,25,000/-
b) Operational cost		
1.	Jack Hammers (6 nos)	1,98,000/-
2.	Compressor (2 nos)	19,82,000/-
3.	Diamond wire saw (1 no)	4,87,000/-
4.	Diesel General 120KVA	4,00,000/-
5.	Excavator (1 no). hire	6,00,000/-
6.	Tippers (2 nos)	58,00,000/-
7.	Drinking water facility for the labours	50,000/-
8.	Safety kits	50,000/-
Sub Total		95,67,000/-
c) EMP Cost		
1.	Afforestation	30,000/-
2.	Water Sprinkling	50,000/-
3.	Water Quality Test	25,000/-
4.	Air Quality Test	25,000/-
5.	Noise/Vibration Test	25,000/-
6.	CSR activities	50,000/-
Sub Total		2,05,000/-
Grand Total		99,97,000/- ≈Rs. 1 Crore

2.9 Technology & Process Description

2.9.1 Technology

Primary step of mining of minerals is the removal of the deposits from the ground. Once the minerals / ore are removed, additional preparation process is required to isolate the valuable minerals from their waste gangue minerals. There are two basic method of mining of minerals opencast and underground mining. The choice of method depends on the geologic, hydrological, geo-technical, geographic, economic, technological, environmental, safety, Socio - political and financial considerations.

The major purpose of mine development is to provide auxiliary and support facilities for physically opening a surface or underground, or mine and bringing it to full production is to be planned. The facilities will not contribute directly to the production operation. It is a period of intensive and diversified activity on the project site with environmental impacts, which are usually different in

nature from operational impacts, which are crucial for successful environmental management. Schematic Diagram of Mining Process is given in **Figure 2-12**.

2.9.2 Method of mining-Open Cast Working

In accordance with the Regulation 106 (2)(a) of the Metalliferous Mines Regulations 1961, in all open cast workings where the ore body forms hard rock, the working faces and sides should be adequately benched and sloped. A bench height not exceeding 6m and a bench width not less than the height has to be maintained. The slope angle of such benches and sides should not exceed 60° from the horizontal. However, observance of these statutory provisions into in granite dimensional stone mining is seldom possible due to the field difficulties and technical reasons as below:

- Recovery of the granite mineral is to be as undamaged rectangular dimensional blocks. In the attempt to the benches and sides with the above statutory parameters haphazard blasting may be involved.
- In which case the commercial granite body may get spoiled due generation of blasting cracks. In the exercise of forming the benches with 60° slope within the granite deposit, the portion confined within the 60° as well as its complimentary part in the extricated block will become as mineral waste while shaping into rectangular blocks.
- The granite industry needs blocks as huge as few cubic meters volume with measurements upto 3m x 2m x 2m.
- Production of such huge blocks with a moving bench of 6m height is not possible. Production of such huge blocks in turn increases the recovery and reduces the mineral waste during dressing.
- Blocks of smaller size of certain varieties of granite are not marketable now-a-days. Formation of too many benches with more height and the width equal to the height may lead to mineral lock up.

Hence in order to avoid granite waste and to facilitate economical and convenient mining operations, it is proposed to obtain relaxation to the provisions of Regulation 106 (2) (a) up to a bench parameter of 6m height and 3m width with vertical faces. Such a provision for relaxation of the Regulation has been provided within the regulation 106 (2) (a). Further, it is to be noteworthy that open cast granite mining operations with the above proposed bench parameters may not be detrimental to Mines Safety, since the entire terrain is made up of hard rock, compact sheet and possess high stability on slope even at higher vertical angles. It is proposed not to backfill the pit in as much as good quantities of reserves are underlying the pits. The stock yard for the granite blocks produced and the dressing yard where the manual dressing and shaping of the blocks are carried out are located near the working pit in order to minimize the lead from the pit to the dressing yard and stock yard. A mine office, store room, first-aid room and workers rest shelter have been provided.

2.9.3 Process Description

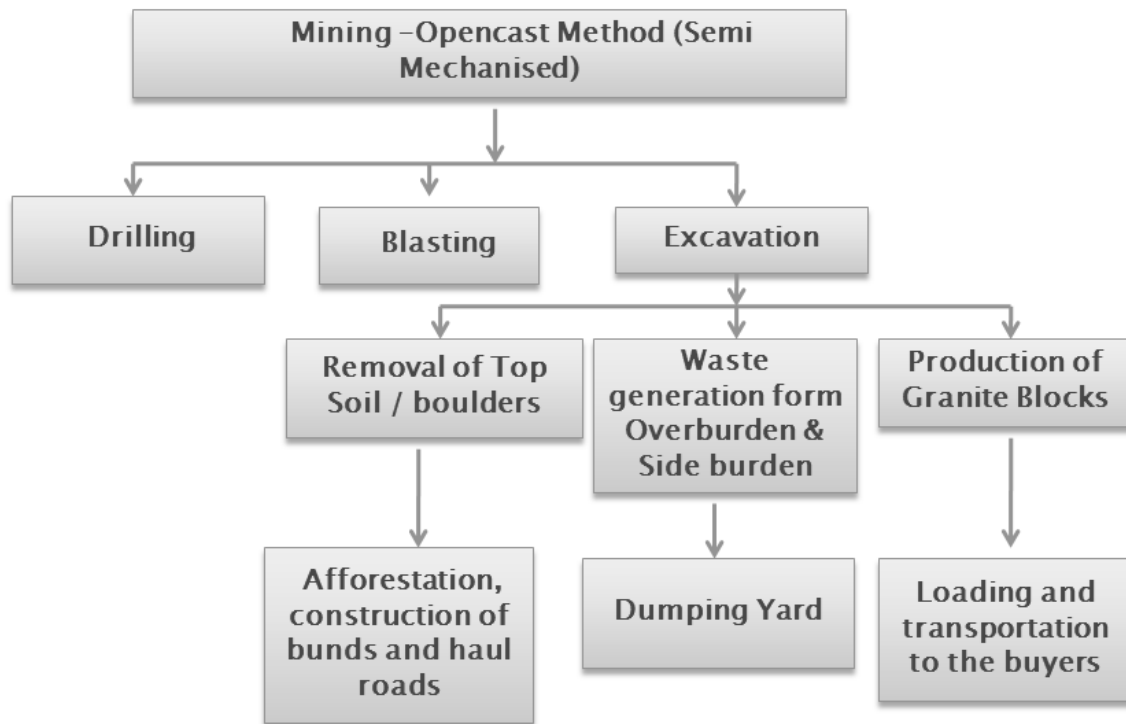


Figure 2-12 Schematic diagram of the mining process

2.9.3.1 Mining

Open cast, semi-mechanized mining with 6m vertical bench with a bench width of 6m has been proposed. Under the regulation 106 (2) (a) of the Metalliferous Mines Regulation 1961 in all open cast working in hard ore body, the benches and sides should be properly benched and sloped. The height of any benches shall not exceed 6m and the width thereof shall not be less than the height.

The benches shall be sloped at an angle of more than 60° from the horizontal. The production of Black granite dimensional stone in this mine involves the following methods typical for granite stone mining, in contrast to any other major mineral mining.

1. Splitting of rock mass of considerable volume from the parent sheet rock carefully avoiding any kind of damage in the form of cracks in the deposit by adopting the following methods.
 - a. Separation of two vertical ends along the width side by diamond wire cutting.
 - b. Separation of the horizontal (bottom) and the vertical (lengthside) planes by serial blasting simultaneously along the above two plans by using 32mm dia blast holes charged with mild explosives like gun powder or detonating cord.

All the above process continued together aiming at the liberation of huge volume of the granite body from the parent sheet rock is called 'primary cutting'.

2. The secondary splitting in to required size involves long hole drilling up to the bottom of the separated block and mild blasting along the required plans.

3. Now-a-days the secondary splitting is carried out by way of splitting and overturning cushion operational procedure. The procedure is by utilizing the compressed air available at the quarry at 7 to 8 bar pressure, initially (widening) splitting up to 15 to 18cms. Next by using super imposed cushion widening up to 80cms and overturning of the blocks.
4. Removing the defective portions and dressing into the dimensional blocks are done manually using feather and wedges and chiseling respectively by the labour that are skilled in this work.

The defect free rectangular shaped dimensional stones as acceptable to consumers are produced by the method described as above which is constantly supervised by experienced mining geologist. The waste material generated during mining activity include the rock fragments of different angularity formed during the works, during the removal of naturally defective and uneconomical portions of the deposits and the working waste formed during dressing of the extricated blocks. Such waste material is proposed to be dumped along northern side the lease boundary / barren area where the commercial granite occurrences are not seen / the area covered with poor quality granite deposit identified to be uneconomical due to sheared and contacted nature or the presence of closely space natural joints, etc.

2.9.3.2 Blasting

The blasting parameters in the mining of Granite dimensional stones are entirely different from that of industrial minerals, since the basic purpose for the use of explosives in both the cases are entirely different. In the industrial minerals, maximum fragmentation and crushing of the ore is essential, whereas in the granite mining, the granite stones are to be extricated intact, without any damage on both the extricated part and the parent rock body. Wagon drilling and heavy blasting is seldom used in granite mining.

The portion to be extricated from the parent rock body is freed in all planes by adopting different methods as described in chapter 4.0. Only mild explosives such as gun powder, detonating cord, ordinary detonators etc will be used for the production of granite blocks. The blast holes of 32mm diameter are drilled upto the bottom of the horizontal plane all along the required planes without deviations sub grade drilling is avoided, since it may damage the underlying granite deposit.

Conventional 32 mm dia blast holes are drilled perfectly parallel to each other at 20 to 25cm intervals without any hole deviations, all along the required plane of splitting. The holes are drilled upto a depth few cms above the required horizontal plane. Sub grade drilling is not necessary since the splitting will be affected upto a further distance of few cms from the drill hole on blasting. Sub grade drilling may affect the underlying granite deposit.

Explosives such as gelatin, delay detonators etc may also be used occasionally at places further away from the granite deposit for certain development works such as forming approach roads to

the working faces below ground level for forming flat surfaces to be used as dumping yard etc. The explosives required for this mine is obtained from the authorized, licensed dealer for which necessary permission will be obtained from the authority concerned. The blasting will be under the direct supervision of the statutory persons of TAMIN.

Now-a-days the splitting within the sheet rock is affected by diamond wire sawing, which largely reduces the use of explosives in granite mining. Many adverse effects of blasting are avoided and hence Diamond wire cutting will substantially increase the recovery. Hence it is proposed to deploy one wire saw machine in this quarry during its operation.

2.9.3.3 Loading & Transportation

The mode of transport of the granite blocks produced and marketed is by road of various consumer destinations and granite processing units located at different parts of the country. The blocks approved for export market are shipped through Chennai / Tuticorin Harbours to various countries.

2.9.3.4 Exploration

A number of valuable data for economical mining of the granite stone in this area have already been known from the actual mining practice during the past 33 years in this field.

1. Occurrence of the Black granite stone in economically viable quality and quantity has been established by geological mapping and visual examination by mining geologist experienced in granite mining which have been proved by actual mining practice.
2. The depth persistence of the granite stone is proved beyond the workable limits of 30 m from the petro genetic character of the granite body as well as from the actual mining practice. Considering the hilly deposit with sheet rock formation of 30m depth persistence from the surface level has been taken as economically workable depth to include all the three categories of mineral reserves viz, proved, probable and possible reserves.
3. The recovery of the saleable granite stones has been established as 5% from the visual exploration and from the data available by actual mining practices during the past mining in this area. As the sale of granite dimensional stone is in terms of volumes (cubic meter) only and not in terms of tonnage as in the case of the mining of Industrial minerals, the geological reserves, mineable reserves and quantum of waste generation etc., are given in terms of cubic meter (volume) only.

The details of estimation of geological reserves and mineable reserves with reference to the geological plan and sections in Plate No: -3 and conceptual plan and sections in Plate No: -6 which have been furnished as **Annexure 9 & Annexure 12**.

2.9.3.5 Storage of Explosives

The applicant will engage an authorized explosive agency to carry out the small amount of blasting. As such no storage of explosives is envisaged for this proposal. The blasting will be supervised by DGMS authorized foreman/ mines manager.

2.9.3.6 Mine drainage

The mine area is an elevated ground with gentle slope on both sides of the linear dyke. Hence there is natural drainage system facilitating easy and comfortable drainage of rain waters. However, as a precaution, catch drains has been formed all around the working pit and it has been led to the natural drainage, so that the rain water will not enter the working areas. A diesel engine with 5 H.P capacity is kept at the mine site to meet any eventuality of bailing out the rain water to the natural drainage outside to carry out the mine working uninterrupted.

2.10 Requirements

2.10.1 2.10.1 Land Requirement and Land Use Planning

Quarry Land use pattern details are shown in **Table 2-13** and Land use pattern in provided in **Table 2-14**.

Table 2-12 Quarry Land details

District	Taluk	Village	S.F. No.	Area in Ha	Occupancy /ownership
Dharmapuri, Tamilnadu	Palacode	Panchapalli & Namandahalli	287&19	9.48.0&7.06.0	Government Poramboke land

Table 2-13 Land Use Pattern of the quarry area

S. No.	Description	Present Area (Ha.)	Area to be required at the present Scheme Period (Ha.)	Area at the end of life of Quarry (Ha.)
1.	Area under Quarrying	2.26.0	10.40.5	13.35.0
2.	Waste Dump	3.23.5	2.65.0(including Afforestation 0.06.5)	2.65.0(including Afforestation 0.50.0)
3.	Office Infrastructure	0.02.5	0.02.5	0.01.5
4.	Village Roads	0.07.0	0.07.0	0.07.0
5.	Mine approach road	1.39.0	0.30.0	0.03.5
6.	Green Belt	0.12.5	Over waste dump	Over waste dump
7.	Unutilized	9.43.5	3.09.0	0.42.0
Total		16.54.0	16.54.0	16.54.0

2.10.2 Water Requirement

The total water requirement is 1.5 KLD. The total water requirement will be met from water tanker suppliers. Domestic wastewater will be treated in Septic Tank followed by soak pit. Septic Tank will be cleaned periodically. The water requirement break up is given in **Table 2-15**.

Table 2-14 Water requirement breakup

S. No	Description	Water Requirement (KLD)
1	Drinking water& Domestic purpose	0.5
2	Wire saw cutting purpose	0.3
3	Dust suppression	0.3
4	Green belt	0.4
Total		1.5

2.10.3 Power Requirement

- ▶ DG Set with a capacity of 125 kVA will be used to meet the power requirement of 60 kVA.
- ▶ Diesel (HSD) will be used for quarrying machineries around 200 liters of HSD will be used per day.
- ▶ Diesel will be brought from nearby diesel pumps.

2.10.4 Fuel Requirement

The Power requirement is 60 kVA met through one DG Set with a capacity of 125kVA. Diesel (HSD) is being used for quarrying machineries around 200 liters/day of HSD is being used. Diesel will be brought from nearby diesel pumps. Fuel requirement is shown in **Table 2-16**.

Table 2-15 Fuel requirement

S. No	Details	Existing
1	Power requirement (kVA)	60
2	DG Set capacity (kVA)	1*125
3	Diesel (Liters/day)	200

Source: TAMIN

2.10.5 List of Equipments

The list of Equipment is given in **Table 2-17**.

Table 2-16 List of Machineries

S.No	Machinery	Capacity	Numbers
1	Excavator	300 LC	1
2	Compressor	400 psi	2
3	Dumpers	25 Tonnes	2
4	Diamond wire saw	30 m ³ /day	1

5	Jack Hammers (32mm dia.)	1.2 to 6m	6
6	Diesel Generator	125 kva	1

2.10.6 Man power Requirement

Manpower details are given in **Table 2-18**.

Table 2-17 Manpower Details

S.No	Description	No of persons
1	Manager	1
2	Mine Foreman	1
3	Operators & Drivers	7
4	Workers	20
5	Mechanic	1
Total		30

2.11 Solid Waste Management

The municipal Solid waste generation and management details are given in **Table 2-19**.

Table 2-18 Municipal Solid Waste generation & Management

S.No	Type	Quantity (kg/day)	Disposal method
1	Organic	6.4	Municipal bin including food waste
2	Inorganic	9.6	TNPCB authorized recyclers
Total		16	

As per CPCB guidelines: MSW per capita/day = 0.45

2.12 Hazardous waste Management

The type of hazardous waste and the quantity generated are detailed in **Table 2-20**.

Table 2-19 Hazardous Waste Management

Waste Category No	Description	Quantity (L/Year)	Mode of Disposal
5.1	Waste Oil	3.0	Will be Collected in leak proof containers and disposed TNPCB Authorized Agencies for Reprocessing/Recycling

2.13 Infrastructure facilities

Sanitation facility, office room and rest room facilities will be provided.

2.14 Resource optimization/recycling and reuse envisaged in the project

No optimization/recycling and reuse envisaged in the Black granite quarry.

2.15 Availability of water its source, Energy/power requirement and source

This quarry project does not require huge water and No electricity requirement is proposed for the project. The operations will be carryout in day time only.

2.16 Schematic Representations of the Feasibility Drawing which Give Information Important for EIA Purpose

A schematic representation of the overall feasibility and environmental assessment process is shown in **Figure 2-13**.

. The EIA process is composed of the following stages:

- Study of project information
- Screening & Scoping
- Environmental Pre-Feasibility study & application for approval of TOR
- Collection of detailed project management plan/report
- Baseline Data collection
- Impact identification, Prediction & Evaluation
- Mitigation measures & delineation of EMP
- Risk Assessment and Safety & Disaster Management plan
- Review & finalization of EIA Report based on the TOR requirements.
- Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

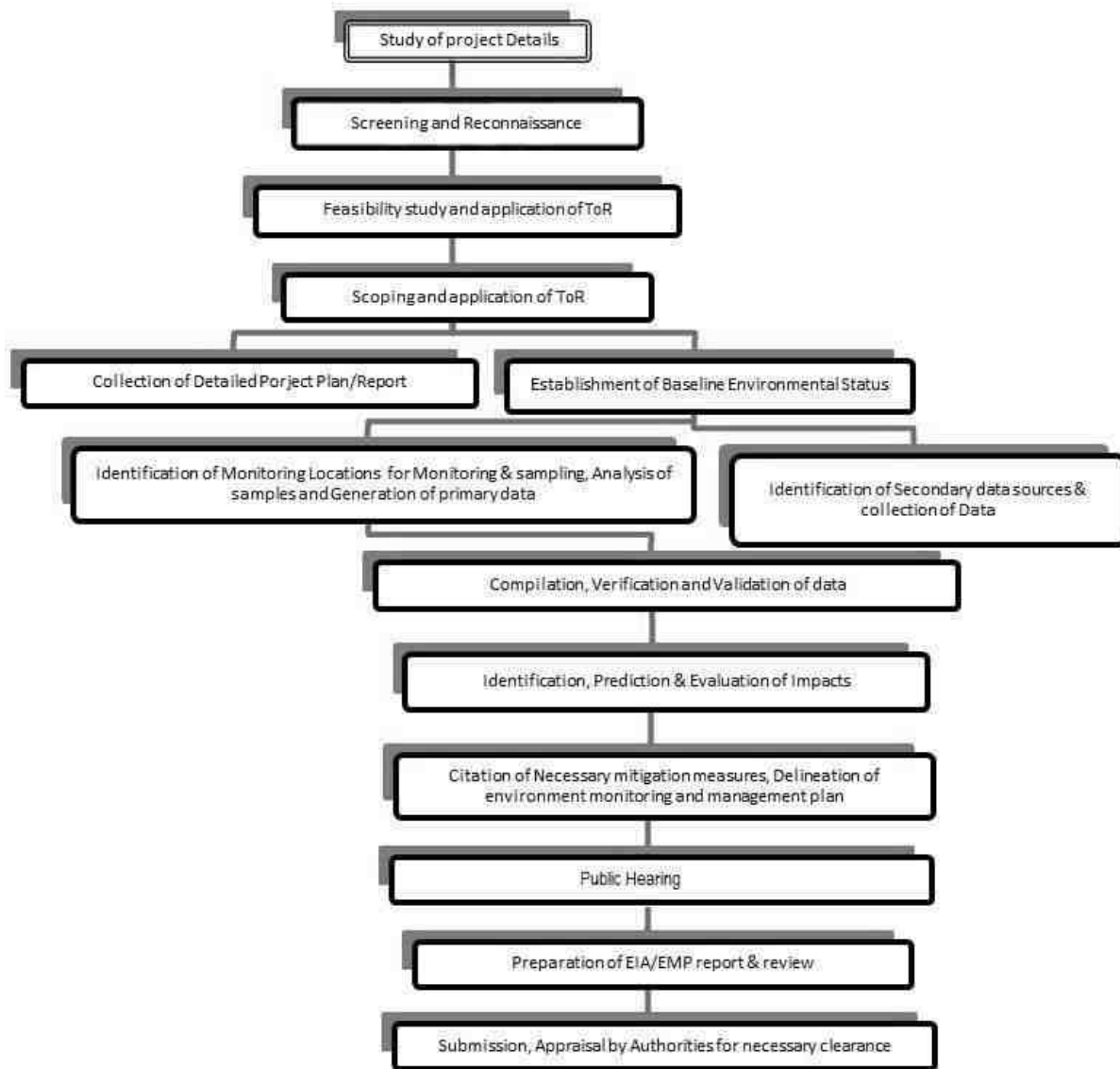


Figure 2-13 Feasibility & Environmental Assessment Process

2.17 Description of Mitigation Measures Incorporated Into the Project to Meet the Environmental Standards

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. The adverse effects that are likely to occur during operational phase of the project are: Air Pollution (gaseous emissions), Effluent generation, Noise generation, Solid waste generation etc.

2.17.1 Land Environment

The land use of the existing area is already for Mining purpose. Hence there will be no change in land use pattern.

Discharges on Land-Impact

Domestic:

In existing domestic wastewater is disposed in to septic tank followed by soakpit.

Mitigation Measures

- The mine waste in the mine include the topsoil/rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation, formation or dumping yard sites etc.
- The dumps may also be source of airpollution due to wind erosion incase they are not properlyrehabilitated. Topsoil and overburden will be generated from the proposed mining project which will be stacked separately at the designated areas.

i. Impacts- Soil Contamination

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various operations in the project site like municipal waste from domestic use and waste diesel oil from quarry machineries. Poor management of such materials/wastes from the operations is a potential risk of soil contamination.

ii. Soil – Mitigation Measures

Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination. The wastes generated will be stored in temporary storage facility and transferred to nearby municipal disposal bins. Waste diesel oil is being generated from quarry machineries is disposed through PCB Authorized dealers.

2.17.2 Air Environment

Mining operations contribute towards air pollution in two ways: addition of gaseous pollutants to the atmosphere and the dust particles. The gaseous pollutants include NO_x, SO₂ and Hydrocarbons. The sources of pollutants from the mining activity include:

- Operation of Heavy Earth Moving Machinery (HEMM) which mostly run on diesel
- Loading /unloading operations
- Transportation of mineral/overburden in dumpers
- Ripping/Dozing, Drilling and Blasting operations.

Sources of Air Pollution

a. Point Source/Single Source

These are stationary sources, which emit air pollutants into the atmosphere from a certain fixed point. In the proposed mine, the following sources or activities from the point sources, which emit Suspended Particulate Matter (SPM).

b. Drilling

Drilling is an important activity of mining process. The secondary splitting in to required size involves long hole drilling up to the bottom of the separated block. Air pollution in the form of SPM is envisaged from this activity.

c. Loading

In the proposed project, the loading of side burden and granite rejects is proposed by Hydraulic excavators. This activity is likely to contribute air pollution in the form of SPM (dust) during discharge of material from bucket and gaseous pollutant like SO₂, NO_x and Hydrocarbons due to combustion of fuel (diesel) in the loading machinery.

d. Unloading

The generated rejects and granite at mine face will be transported by dumpers and unloaded at the designated locations. During unloading operation of both the material, air pollution in the form of SPM (dust) is envisaged due to discharge of material from the dumper and gaseous pollutants like SO₂, NO_x and Hydrocarbons due to consumption of fuel (diesel) by dumper while unloading the material.

e. Line Sources

These are normally mobile sources, which emit atmospheric pollutants in the area through which they pass. The following are the sources of air pollution falling under this category.

f. Transportation

The generated rejects and granite from site will be transported by haul road. Transportation also includes movement of service vehicles also in the mine lease area. The traffic on the haul roads is likely to contribute towards increase in dust and gaseous pollutants concentration in the area. However, this is more of a localized phenomenon within the mining areas that have limited human exposure.

g. Area Sources/Multiple Sources

These constitute pollution from various sources and activities situated in the mine lease area. The total mine area with all its mining activities constitutes the area source. These include all the mining activities, operations of equipment/machinery (HEMM), wind erosion from active mine pit, waste dump locations and haul road which contribute to the atmospheric pollution from the various units/activities.

h. Instantaneous Sources

The instantaneous sources consist of air pollution due to sudden/instantaneous activities like blasting in the mine area. Blasting process involves dislodgement of big blocks of hard strata/mineral from the

mines. This operation generates maximum dust, which results in the increase of SPM concentration. It also contributes to emissions of certain gases (Oxides of Nitrogen and Ammonia) due to the use of explosives.

The size of the dust particles emitted into the atmosphere plays a major role in deciding the distance to which they may be transported. Particles of larger size fall fairly rapidly and closer to their source, because of gravitational settling. However, the aerosols because of their small size may be held in suspension for years in the atmosphere and may be transported on a global scale. Eventually, these smaller particles are collected in rain drops and fall on earth. The composition of these particles largely depends on the composition of the mineral being processed.

Mitigation Measures

- The increment in the fugitive emissions will be mainly due to transportation activity. Therefore emissions due to mineral handling during mining operation are not much and restricted to the lease area only.
- Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:
 - Watering of haul roads and other roads at regular intervals
 - Spraying of water on permanent transport roads at required frequencies.
 - Provision of dust filters / mask to workers working at highly dust prone and affected areas.
 - Provision of green belt by vegetation for trapping dust.
 - Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
 - Utmost care will be taken to prevent spillage of sand and stone from the trucks.
 - Covered tarpaulin for transport of materials

2.17.3 Noise & Vibration Environment

The sound pressure level generated by noise source decreases with increasing distance from the source due to wave divergence. The main sources of noise in the mine are as follows:

- Transportation vehicles
- Loading & unloading of minerals.
- Drilling and Blasting

Noise Levels

Heavy Earth Moving Machineries (HEMM) is deployed in mechanized mining operations. The noise levels of the major equipment are in the range of 88 to 90 dB (A). The noise levels are localized

within the mining areas and have human exposure. Occupational hazard is envisaged if proper personal protective equipment is not provided to operator.

Vibration

The vibration due to blasting can cause damage to the nearby structures if appropriate technology and control measures are not adopted in the blasting operation. Fly rock is another possible damage causing outcome of blasting. There are many factors which influence fly rock during blasting. Most important of these factors are long explosive column with little stemming column, improper burden, loose material or pebbles near the holes and long water column in the hole.

By adopting controlled blasting, the problems will be greatly minimized and the impacts will also be minimized by choosing proper detonating system, optimizing total charge and charge/delay.

Ground vibration, fly rock, air blast, noise, dust and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants. The impact will be minimized by choosing proper detonating system and optimizing total charge and charge/delay and by regular monitoring of magnitude of ground vibrations and air blast.

Impact

A noise generation source during operation phase is classified into two categories:

- Stationary sources due to operation of heavy duty machineries at the project site like Compressors, DG sets, Quarry vehicles and drilling machineries etc.

Mitigation Measures

- The major noise generating equipments like Compressors, DG sets, etc. will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
- Drilling will be carried out with the help of sharp drill bits which will help in reducing noise.
- Secondary blasting will be totally avoided.
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained.
- The blasting will be carried out during favorable atmospheric condition and less human activity timings i.e. during lunch interval or during change of shifts.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- Adequate silencers will be provided in all the diesel engines.

- Green Belt and Plantation will be developed around the mining activity area and long haul roads. The plantation minimizes propagation of noise.
- Periodical monitoring of noise will be done.
- The occupational noise exposure to the workers in the form of eight hourly time weighted average will be maintained well within the prescribed Occupational Safety and Health Administration (OSHA) standard limits.
- Adequate PPE will be provided to the staff exposing to noise risks.
- Acoustic silencers will be provided in equipment wherever necessary.
- Use of personal protective equipments/devices such as ear-muffs, ear plugs etc. will be strictly enforced for the workers engaged in high noise areas.
- Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimise noise emissions.
- Implementation of greenbelt for noise attenuation will be undertaken: shrub plantation; landscaping with horticulture; and Tree plantation at vehicle parking areas and along approach roads.
- Ambient noise levels will be monitored at regular intervals during operational phase of the project.
- Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimize vibrations and secured properly.
- Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.
- Vibration dampers will be provided around the source of generation.
- Transportation Management Plan will be prepared and the transportation of materials will be planned in line with the same.

2.17.4 Water Environment

Impact on Existing Water Resources

The total water requirement for quarry is 1.5 KLD. The total water requirement is met from private tanker. Domestic Wastewater is being disposed into Septic tank followed by soak pit & no toxic/other effluent generation. Hence the impact due to the project is very minimal.

i. Impacts on Surface Water Bodies

The surface water and groundwater are the life line of the villages. All the ponds in the area are working as recharge sites for the under lying groundwater and hence the surface water and ground water systems are acting like a single unit and therefore cannot be seen in Isolation.

Any contamination in surface drainage due to operation of project could collapse the system and will have serious impacts to the water resources especially the availability of potable water in the PIA area. The impacts will be high in the core area. There will be negligible impact of mining on the surface water regime.

ii. Impact on Ground Water

There will not be any ground water withdrawal, as the total water requirement is being met by private tank waters. As, the mine lease area is a Hilly area. The site Elevated 652m - 703m AMSL. Hence, there will not be any groundwater level intersection as the planned depth of mining is 30 m from the top of the hillock.

Mitigation Measures

The following measures are proposed as a part of development to improve the ground water scenario and also to ensure that ground water is not contaminated.

Strategic plans such as implementing the following structures for rainwater harvesting and groundwater recharging purposes in project site will be adhered.

- Rainwater storage ponds/tanks
- Storage cum recharge ponds
- Monitoring of water quality and groundwater level variations in the project site.

2.17.5 Biological Environment

Impact on Migratory Paths for Wildlife and Forest Blocks

There are no identified migratory paths for major and minor wildlife in the project site and the study area. The identified fauna which are observed at the project site and in the study area are local migrants only. Therefore, the proposed project operations are not likely to have any adverse impact on the paths for avert-fauna.

Mitigation Measures

- Discharge of wastes into the water bodies during the quarry operation phase would not be allowed.
- Awareness will be given to workers about the importance and conservation of terrestrial ecology and biodiversity.

2.17.6 Solid Waste Management

Impact due to Solid Waste Generation

During quarry operations, various types of solid waste are likely to be generated which can be broadly categorized as Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste generation may include Biodegradable, Recyclable and Inert compounds. The details of solid waste generation and its management proposed are discussed in **Chapter 2, Section 2.9**. If the solid waste generated is not properly managed and disposed in unauthorized manner, it will impact on soil quality, groundwater and air quality.

Solid Waste Management

Strict guidelines will be put in place in order to manage the solid waste generation during the operational phase of the development. The main goals of the guidelines will be to ensure adopting recycling techniques and encouraging sorting of solid waste at source into organic and inorganic wastes. Waste management is given in **Figure 2.14**.

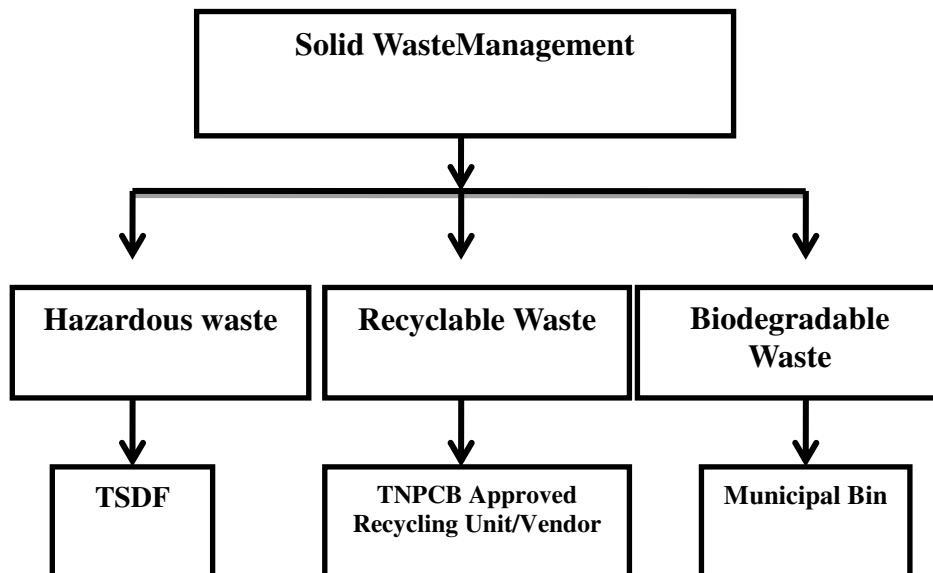


Figure 2-14 Waste Management Concept

2.18 Assessment of new and untested technology for the risk of technological failure

The project is Black Granite quarry project. The technology used for mining is made by TAMIN in house there would not be any changes in the Mining. The mining technology is tried & tested method, and therefore there is no risk of technological failure. In addition to this the facility is being processed to care of the any technological failures.

3 DESCRIPTION OF ENVIRONMENT

3.1 Preamble

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the project area is located at survey no: 287 (Panchapalli) & 19 (Namandahalli), located at Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu State. The primary baseline data monitored covered three (3) months i.e., from **Mid of January 2023 – Mid of April 2023**, and secondary data was collected from Government and Semi-Government organizations. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) Ltd, Chennai, and a MoEF & CC approved Environmental Testing Laboratory for the following Terrestrial environmental components.

- **Meteorology:** Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section - 3.6**
- **Ambient Air Quality:** Particulate matter <10 micron size (PM₁₀), Particulate matter <2.5 micron size (PM_{2.5}), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), Lead (Pb), Ozone (O₃), Benzene (C₆H₆), Benzo (a) pyrene (C₂₀H₁₂), Arsenic (As), Nickel (Ni), Ammonia (NH₃) and free Silica - **Refer Section - 3.7**
- **Ambient Noise Levels:** Day equivalent noise levels, Night equivalent noise levels - **Refer Section - 3.8**
- **Water Quality:** Groundwater Quality, Surface Water Quality - **Refer Section - 3.9**
- **Soil Quality - Refer Section - 3.10**
- **Ecology - Refer Section - 3.11**
- **Social Economic Status - Refer Section - 3.12**

3.2 Study Area

A 10 km radial distance from the proposed project site boundary has been identified as the General study area for assessing the baseline environmental status. The core study area is the project area and its immediate surroundings to the tune of 1.0 km radius from the boundary. Further the Project Impact/Influence Area (PIA) is 10 km from the boundary of the project site which covers parts of in Panchapalli & Namandahalli Villages, Palacode Taluk, Dharmapuri District, Tamil Nadu State.

3.3 Description of the Study Area

As described in Chapter 1, M/s. TAMIN proposes Panchapalli & Namandahalli Black Granite & Granitic Gneiss quarry lease over an extent of 16.54.0 Ha at S.F. Nos: 287 (Panchapalli) & 19 (Namandahalli), located at Panchapalli & Namandahalli Villages, Palacode Taluk, Dharmapuri District, and Tamil Nadu State. The proposed project site is located approximately at a distance of 7.65km to Rajakkottai Railway Junction towards NE and Kempegowda International Airport-

Bengaluru towards NNW. An overall idea of the study area with reference to the physical conditions are presented for better understanding in the following sections before proceeding into the section on the prevailing environmental conditions of the study area. The map showing the satellite image of the study area is given in **Figure 3-1** and Topo Map of the study area is given in **Figure 3-2**.

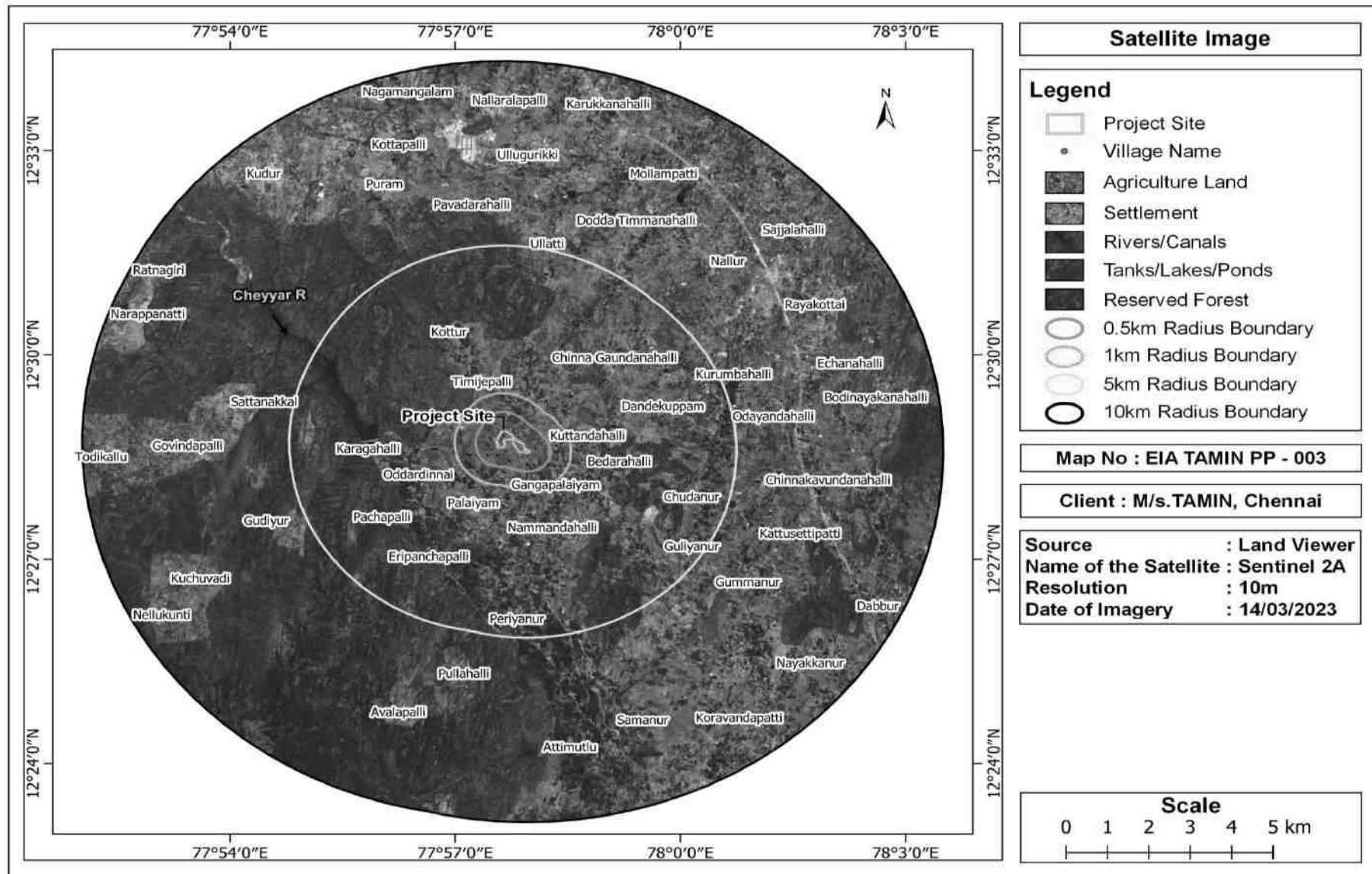


Figure 3-1 Map showing the Satellite Image of the study area of Project

3.4 Environmentally/Ecologically Sensitive areas

This section details with the environmentally sensitive areas present within the project site and surrounding environs. It included national parks, state forest, essential habitats etc. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in **Table 3-1** and **Figure 3-3**.

Table 3-1 Environmentally Sensitive Areas within 15km from Project Boundary

S.No	Areas	Distance & Direction from project boundary					
		S.No	Wild life Sanctuary	Distance (~km)	Direction		
1	WildLife Sanctuaries, Waterbodies & Reserve Forest	1.	Cauvery North Wildlife Sanctuary ESZ	Crossing with in the Site			
		2.	Cauvery North Wildlife Sanctuary Core	0.88	NW		
		Reserve Forest					
		1.	Udedurgam RF	0.88	WNW		
		2.	Marandahalli Ext RF	2.78	WSW		
		3.	Aiyur RF	5.54	WSW		
		4.	Aiyur Ext RF	6.36	W		
		5.	Marandahalli RF	7.36	SSW		
		6.	Denkanikota RF	10.87	WNW		
		7.	Sameri RF	12.55	SW		
		8.	Galligattam RF	12.75	SSW		
		9.	Aiyur Ext No.2 RF	13.72	SW		
		10.	Nayanasandiram Agraharam RF	13.82	SW		
		11.	Kolatti RF	14.45	WSW		
		12.	Toluvabetta RF	14.91	SW		
		Water bodies					
		1.	Sanatkumara N/Chinnar R	1.94	SW		
		2.	Chitra Pallam	4.39	E		
		3.	Totti Pallam	5.78	WNW		
		4.	Gudravalli Pallam	8.78	S		
		5.	Bupanur Halla	10.25	SSE		
		6.	Dabkul Vankal	10.77	SW		
		7.	Ponnaiyar R	11.26	NNE		
		8.	Eripanchapalli lake	2.49	SSW		
		2	Manmade	Places			
				Schools			
				1	Vedampatti PUMS School	1.45	ESE
				2	Palayam Govt High School	1.49	S
3	Ullugurukkai Govt High School			7.97	N		
4	Marandahalli Govt Boys High School			10.05	SSE		
5	Bevanatham Govt Hr Sec School			10.75	WNW		
Villages							
1.	Kuttandahalli			0.42km	E		

		2.	Gangapalaiyam	0.63km	S
		3.	Oddardinnai	1.05km	SW
		4.	Palaiyam	1.10km	S
		5.	Timijepalli	1.11km	N
		Colleges			
		1	Sri Moogambigai College of Arts and science for Women	14.81	SE
		Hospitals			
		1.	Panchapalli Govt PHC	2.74	SW
		2.	Gummanur Govt Veterinary Hospital	6.35	ESE
		3.	Ullukurukkai Govt PHC	7.72	N
		4.	Rayakottai Govt Health and Wellness Centre	7.82	NE
		5.	Marandahalli Govt Community Health Centre	10.67	SSE
		Government Buildings			
		1.	Gummanur VAO Office	6.35	ESE
		2.	Rayakottai Fire and Rescue Station	7.00	ENE
		3.	E3 Rayakotai Police Station	7.98	ENE
		4.	Marandahalli Town Panchayat Office	10.07	SSE
		5.	Amani Mallapuram Townpanchayat and VAO Office	14.25	SSE
		6.	Gummanur VAO Office	6.35	ESE
		Religious Places			
		1.	Muneshwaran Temple	0.15	S
		2.	Sri Guduru Girija Malleshwara Temple	5.68	WSW
		3.	Ibrahim Masjid	2.83	SW
		4.	Malleshwara Temple	5.73	SSE
		5.	Our Lady of Lourdes Shrine	10.84	N
		Industries			
		1	Tata Electronics Pvt Ltd	7.31	N
3	State, National boundaries	Nil			
4	Nearest Highway	S. No	Description	Distance (~Km)	Direction
		1	SH-85 (Rayakottai - Mathigiri)	6.94km	NNE
		2	NH-844 (Hosur - Dharmapuri)	6.42km	E
		3	Nearest Road (Ullatti - Palayam Rd)	Within the Site	
5	Nearest Railway station	S. No	Description	Distance (~Km)	Direction
		1	Rajakkottai	7.65km	NE
6	Nearest Airport	S. No	Description	Distance (~Km)	Direction
		1	Bengaluru International Airport	81.44km	NNW
7	Nearest Port	S. No	Description	Distance (~Km)	Direction
		1	Chennai Port	260.24km	ENE

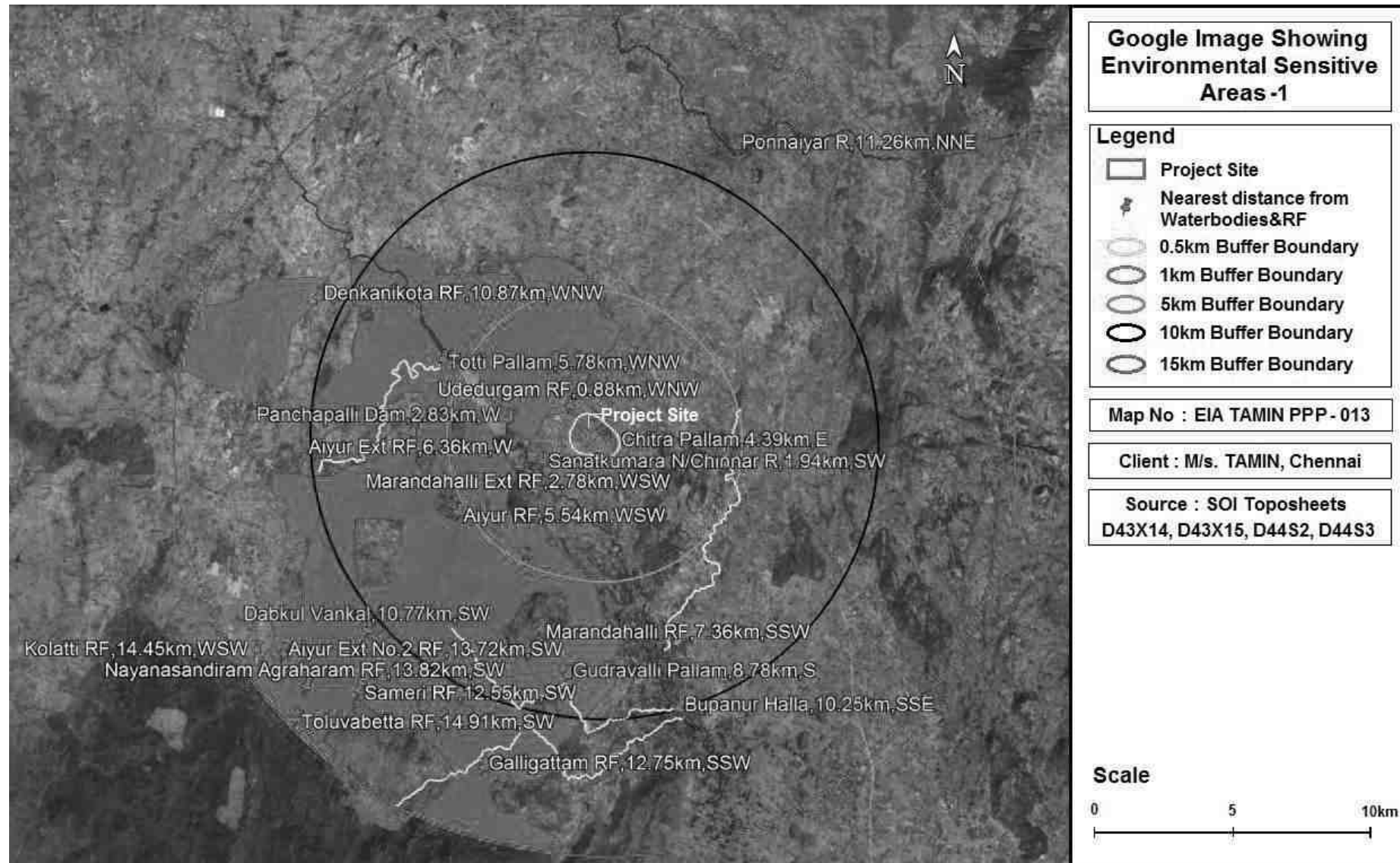


Figure 3-3 Environmental sensitive areas covering within 15 km from project boundary

3.5 Physical Conditions of PIA district

In this section, the physical conditions of PIA district are discussed in general and wherever possible references to the conditions prevailing in the study area in particular are also provided. The physical conditions are discussed as under:

- District profile
- Drainage, land use, geology, Physiographic
- Natural resources

Climatic conditions, seismic zone characteristics and natural hazard

3.5.1 PIA District Profile

Dharmapuri district lies between 11°47' and 12°33' of Northern latitude and 77°02' and 78°40'30'' of Eastern longitude. This district is bounded on the north by Krishnagiri district, on the east by Tiruvannamalai and Villupuram districts, on the south by Salem district, and on the west by Karnataka's Chamarajanagar district. The total geographical area of the district is 4497 sq kms, i.e. 3.46% of Tamil Nadu. This district is placed at 14th rank in comparison to other districts in terms of area in Tamil Nadu.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_D_HARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Dharmapuri District", Series-34 Part XII-A)

3.5.2 Climatic Conditions

The district has hot and dry weather in summer during March to May with the mean daily maximum temperature of about 37°C and the mean daily minimum temperature of about 25°C in the plains. The district temperature is a gradual decrease of both day and night from June to December, when the mean daily maximum is about 30°C and the mean daily minimum about 19°C in the plains. April and May are the hottest months in the year with a highest temperature being 38°C in April. The climate becomes cool in December and continues up to February, touching a minimum of 17°C in January.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_D_HARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Dharmapuri District", Series-34 Part XII-A)

3.5.3 Natural Resources of PIA District

3.5.3.1 Flora & Fauna

Vathalmalai or Vytla Hills is a village in Dharmapuri taluk having an area measuring nearly 225 sq. kms. These protected areas are especially known for several threatened and endemic species including Nilgiri Thar, the Grizzled Giant Squirrel, the Nilgiri Wood-pigeon, the Gaur, wild pig, the Nilgiri langur, the Sambar, and the Neelakurinji (that blossoms only once in twelve years).

Cauvery North Wild Life Sanctuary is situated within the North Latitudes of Krishnagiri District. It accounts for 468 species of plants, 36 species of Mammals, 272 Species of Birds and 172 species of Butterflies which includes rare, endemic and endangered species such as Grizzled Giant Squirrel, Four-horned antelope, Leopard, Elephants, Dhole, Slothbear, etc.,

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_D_HARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Dharmapuri District", Series-34 Part XII-A)

Source: <https://cdn.s3waas.gov.in/s366368270ffd51418ec58bd793f2d9b1b/uploads/2019/06/2019060452.pdf>

(Ref: District Survey Report for Granite Dharmapuri District TamilNadu State)

3.5.3.2 Forest Resources

Dharmapuri district has tropical forests. Generally, these forest have short shrubs and throne plants. Spider valley located near Hogenakkal is home for many wild animals. The district falls in the migratory path of elephants. Vathalmalai, a mountain hamlet on top of Servarayan hill chain has suitable conditions to cultivate coffee and jack fruit. This district has 150392 hectares of Reserved Forests, 2327.943 hectares of Unclassified Forests, 5672.539 hectares of Reserved Lands.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_D_HARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Dharmapuri District", Series-34 Part XII-A)

3.5.3.3 Irrigation

The different sources of irrigation are canals, wells, tanks, lakes and reservoirs. Tube wells or wells covered 56198.1 hectares which accounted to 93% of the irrigation in the district. Lakes and reservoirs contributed 5% of the irrigation in Dharmapuri district.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_DHARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011, Dharmapuri District”, Series-34 Part XII-A)

3.5.3.4 Agricultural Resources

The important food grains in the district are paddy, cholam, cumbu, ragi and samai. The major pulses cultivated are redgram, greengram, blackgram, horsegram, bengalgram and cowpea. The other commercial crops like cotton, chilly, sugarcane, turmeric, tamarind and corriander are also cultivated in Dharmapuri district.

Source:

https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_DHARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011, Dharmapuri District”, Series-34 Part XII-A)

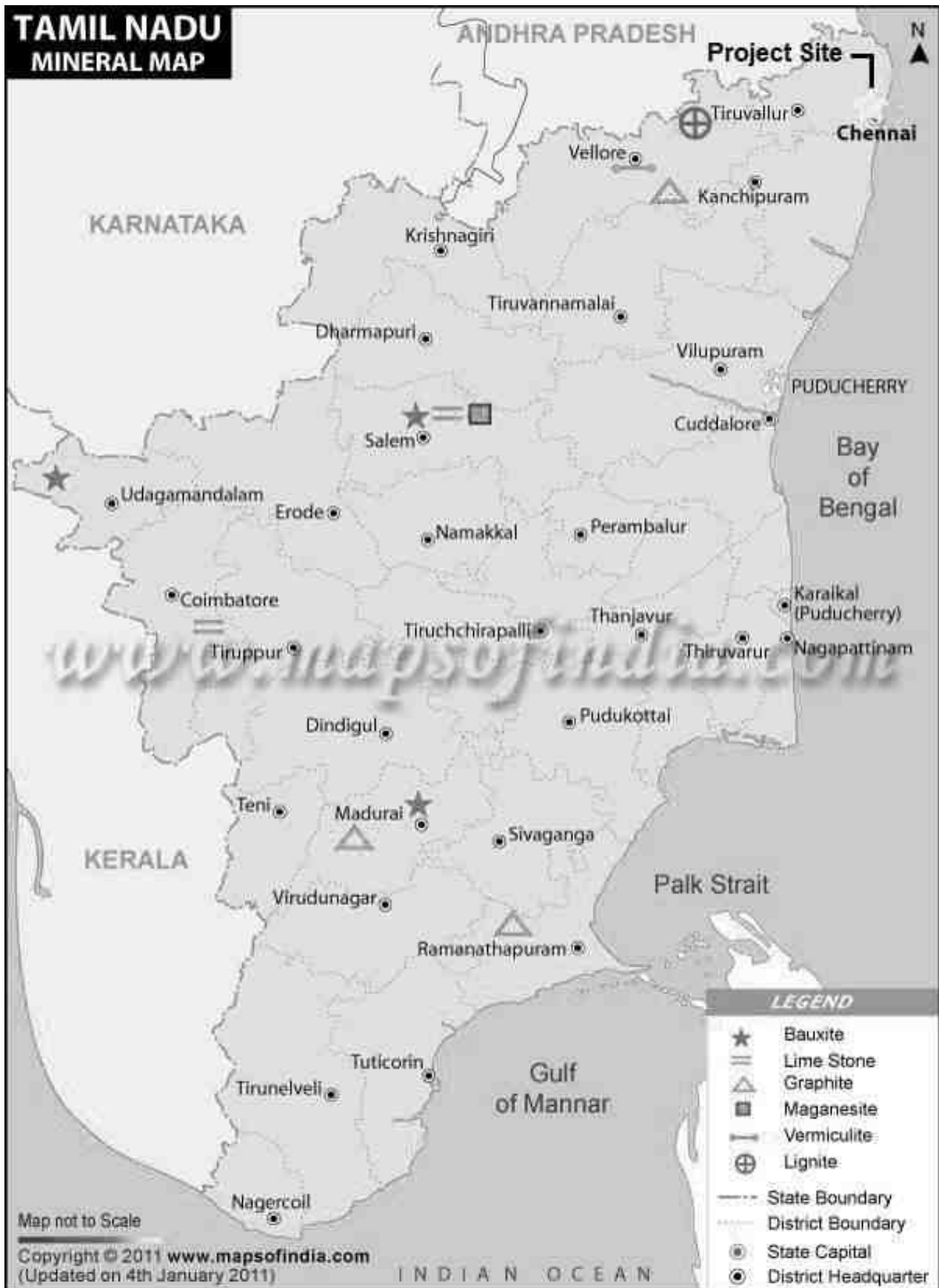
3.5.3.5 Mineral Resources

High quality black granite is present in this district. Quartz is available at Kendiganapalli Village of Pennagaram Taluk, A.Velampatti of Harur taluk and Pethathampatti of Pappireddipatti Taluk. Another high value mineral available in this district is Molybdenum, it was discovered near Harur by the Ministry of Mines in 2001. It is the only source of the minerals in India.

Source:https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_DHARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011, Dharmapuri District”, Series-34 Part XII-A)

The mineral map of Tamilnadu is shown in the **Figure3-4**



Source: Maps of India

Figure3-4 Mineral Map of TamilNadu

3.5.4 Land Use & Land Cover

Total geographic area of Dharmapuri district is 4616.01 sq.km. Urban Built-up area is 16.3 sq.km and Rural Built up area is 73.1 sq.km. Details of land use/land cover statistics for Dharmapuri district are given in **Table 3-5** and Land Use map of Dharmapuri is given in **Figure 3-6** Land Use pattern of Dharmapuri district is given in **Figure 3-7**.

Table 3-2 District land use/land cover statistics (2015-16) for Dharmapuri district

S. No	Division of Land use / Land Cover	Area in Sq.Km.	Area in acres	Area in Ha	Area (%)
1.	Builtup, Urban	16.3	4027.81	1630	0.35
2.	Builtup, Mining	4.63	1144.10	463	0.10
3.	Builtup, Rural	73.1	18063.38	7310	1.58
4.	Agriculture, Plantation	56.48	13956.49	5648	1.22
5.	Agriculture, Crop land	2287.52	565257.63	228752	49.56
6.	Agriculture, Fallow	352.81	87181.12	35281	7.64
7.	Forest, Evergreen/ Semi Evergreen	63.54	15701.05	6354	1.38
8.	Forest, Deciduous	1286.14	317811.62	128614	27.86
9.	Forest, Forest Plantation	0.88	217.45	88	0.02
10.	Barren/unculturable/ Wastelands, Salt Affected land	1.48	365.72	148	0.03
11.	Barren/unculturable/ Wastelands, Barren Rocky	23.72	5861.33	2372	0.51
12.	Barren/unculturable/ Wastelands, Scrub land	287.89	71139.06	28789	6.24
13.	Wetlands/Water Bodies, River/Stream/Canals	28.91	7143.81	2891	0.63
14.	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	132.61	32768.59	13261	2.87
Total		4616.01	1140639.15	461601	100.00

Source:<https://bhuvan-app1.nrsc.gov.in/thematic/thematic/index.php>

Land Use/ Land Cover Pattern of Dharmapuri District

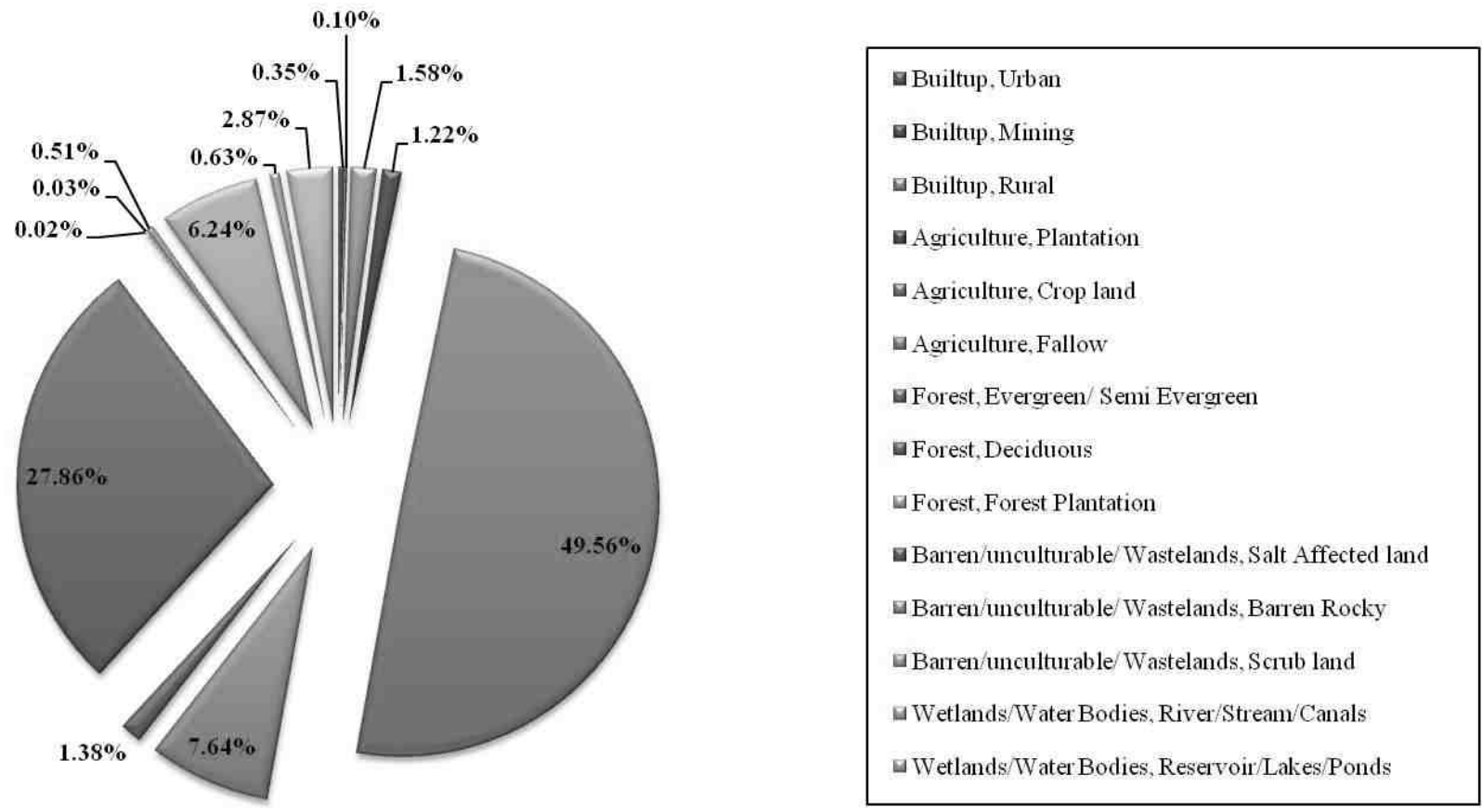


Figure 3-5 Land use/Land cover pattern for Dharmapuri district

Land Use/Land Cover Map of Dharmapuri District

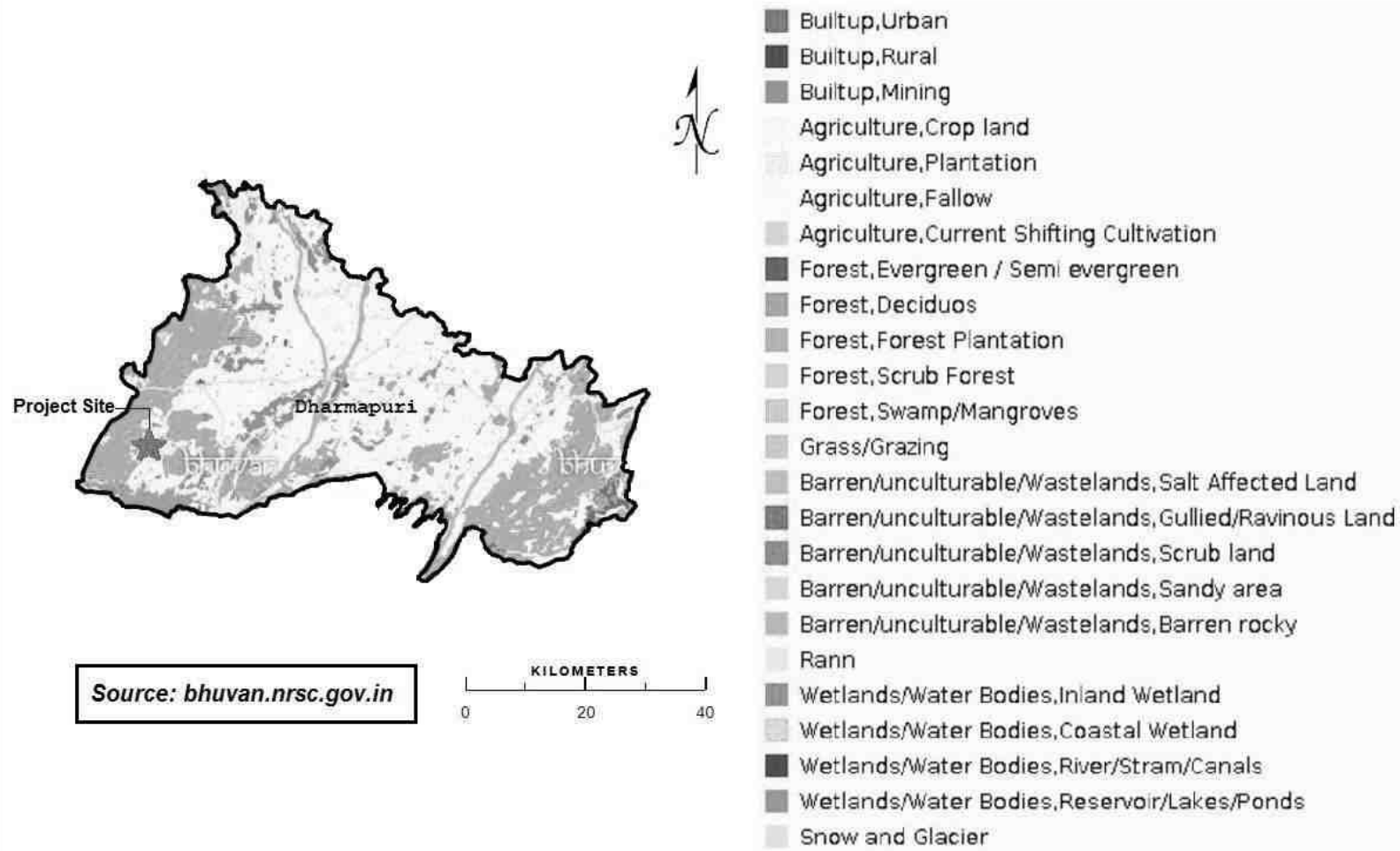


Figure 3-6 Land use/Land cover Map of Dharmapuri district

3.5.4.1 Land use land cover for the study area

The land use pattern of the study area is 337.03 Sq.Km given in **Table 3-3** Land use pattern and land use map of the study area is given in **Figure 3-7** and **Figure 3-8** respectively.

Table 3-3 Land use pattern of the Study Area

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Crop land	110.95	27416.30	11095	32.92
2	Deciduous	110.08	27201.32	11008	32.66
3	Plantation	40.62	10037.41	4062	12.05
4	Fallow	29.59	7311.84	2959	8.78
5	Scrub land	29.44	7274.77	2944	8.74
6	Waterbodies	4.61	1139.15	461	1.37
7	Rural	4.08	1008.19	408	1.21
8	Mining	2.56	632.59	256	0.76
9	River / Stream / Canals	2.23	551.04	223	0.66
10	Barren rocky	2.06	509.04	206	0.61
11	Evergreen / Semi Evergreen	0.54	133.44	54	0.16
12	Urban	0.27	66.72	27	0.08
	Total	337.03	83281.80	33703	100.00

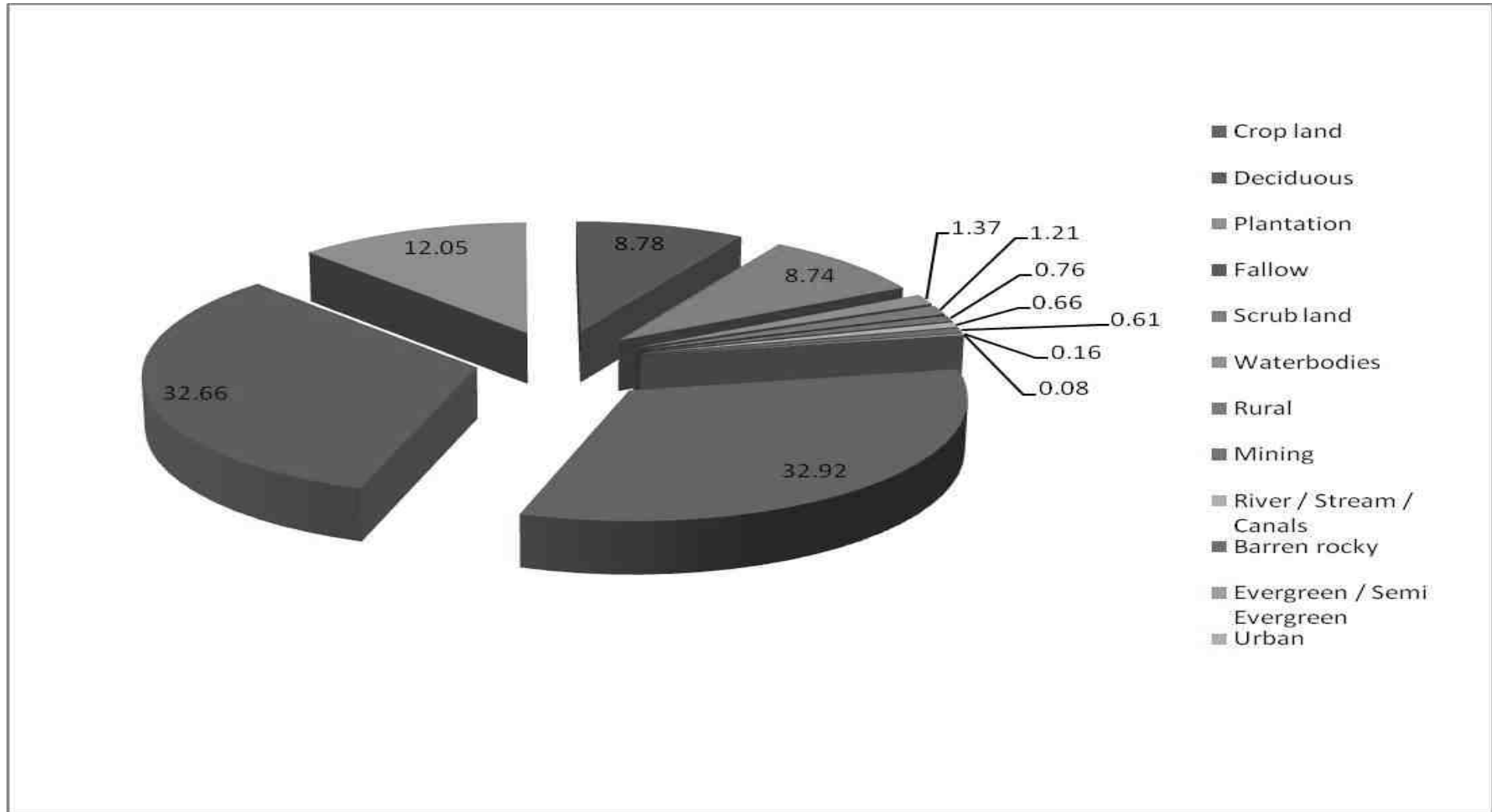


Figure 3-7 Land use pattern of the Study Area

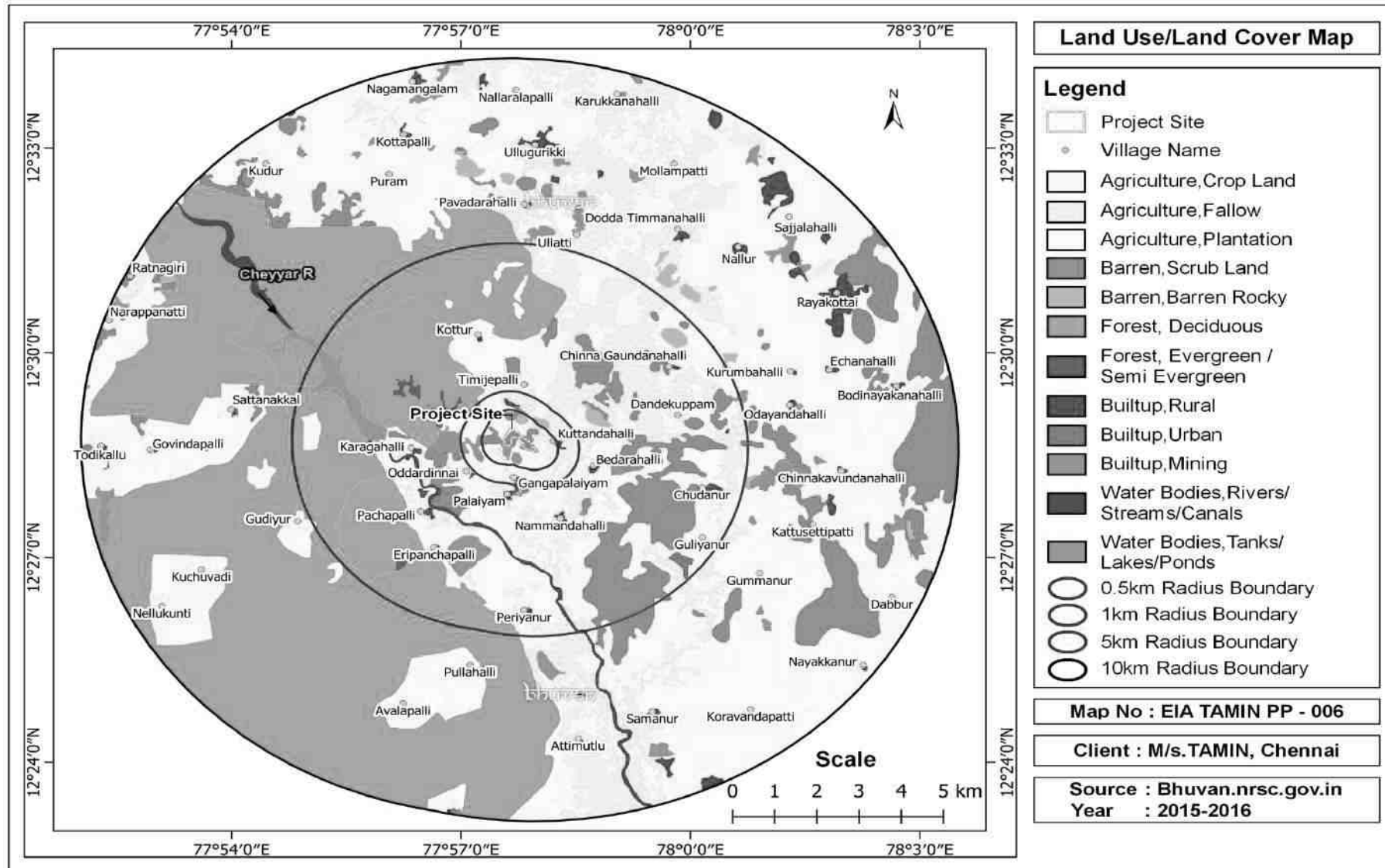


Figure 3-8 Land use map of the Study Area

3.5.5 Topography

Dharmapuri district forms part of the upland plateau region of Tamil Nadu with many hill ranges and undulating plains. The western part of the district between Pennagaram and Denkanikottai has hill ranges of Mysore Plateau with a chain of undulating hills. The southern boundary of the district is occupied by the Servarayan hill ranges. The plains occupying the central, eastern and southern parts of the district have an average elevation of 488 m above mean sea level. Physical map of Tamilnadu is given as **Figure 3-9** and Topo map of study area is given as **Figure 3-2** and contour map of the study area is given as **Figure 3-10**.

Source:https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_D_CHB_DHARMAPURI.pdf

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Dharmapuri District", Series-34 Part XII-A)

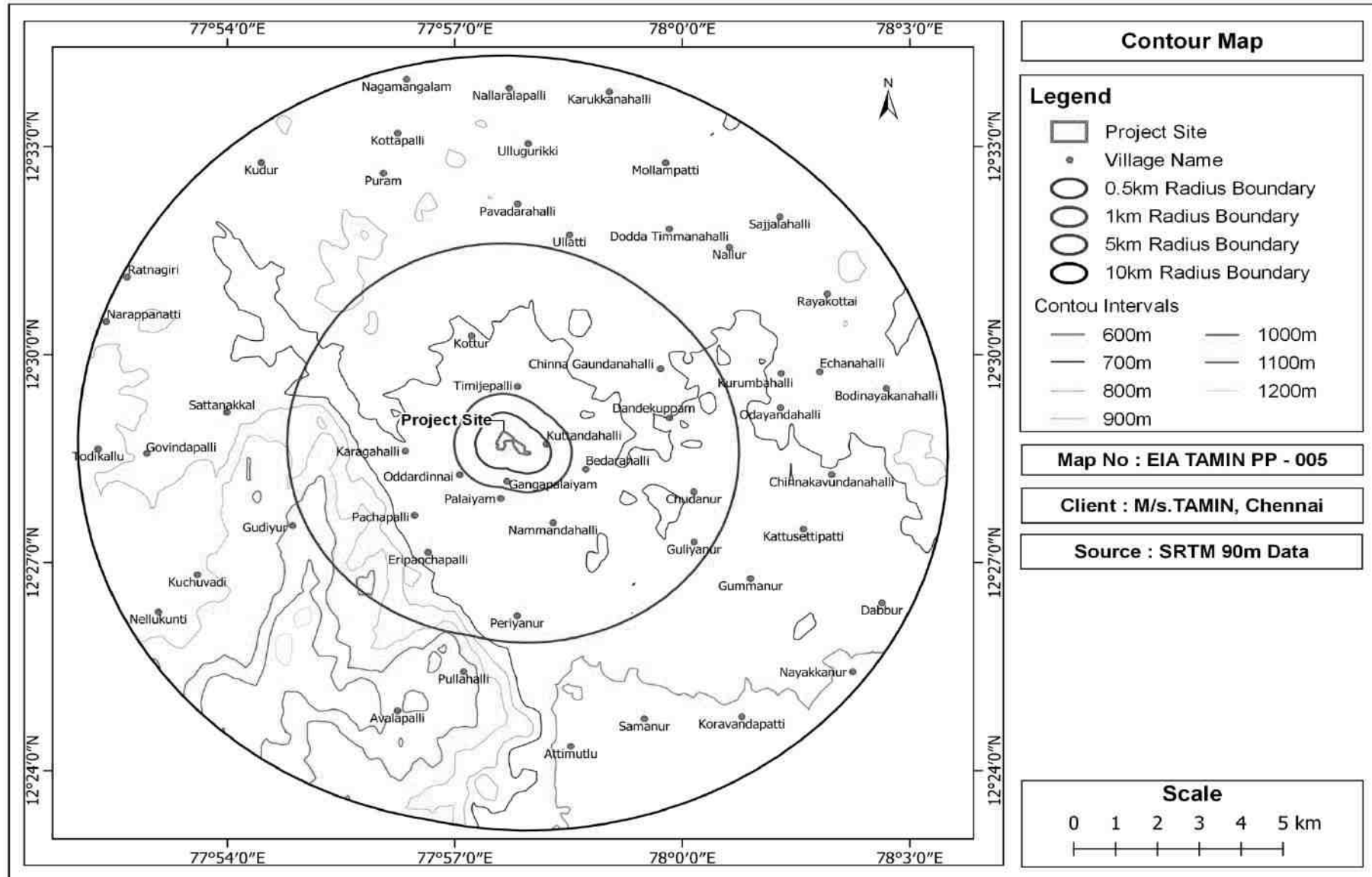


Figure 3-10 Contour map of the Study Area

3.5.6 Geomorphology of PIA District

Dharmapuri district forms part of the upland plateau region of Tamil Nadu with many hill ranges and undulating plains. The western part of the district between Pennagaram and Denkanikottai has hill ranges of Mysore Plateau with a chain of undulating hills. The southern boundary of the district is occupied by the Servarayan hill ranges. The plains occupying the central, eastern and southern parts of the district have an average elevation of 488 m above mean sea level. The Plateau region along the western boundary and the northwestern part of the district has an average elevation of 914 m above mean sea level. The prominent geomorphic units identified in the district through interpretation of satellite imagery are Structural Hills, Inselberg, Pediments, Buried pediments, Shallow Buried Pediments, Plateau, Flood plain, and Bazada Zone.

The Geomorphology Map of the Dharmapuri District is shown as Figure 3-13.

Source:https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_D_CHB_DHARMAPURI.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A)

3.5.6.1 Geomorphology of the study area

Total geographical area of the study area is 337.03 Sq.Km. The Geomorphology pattern of the study area is given in **Table 3-4**, Geomorphology pattern of the study area is given in **Figure 3-11**. Geomorphology map of the study area is given in Figure 3-12. The Geomorphology map of the study area is shown in the **Figure 3-13**.

Table 3-4 Geomorphology pattern of the study area

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Denudational Origin-Pediment-PediPlain Complex	193.89	47912.42	19389	57.53
2	Structural Origin-Moderately Dissected Hills and Valleys	114.83	28374.43	11483	34.07
3	Structural Origin-Low Dissected Hills and Valleys	11.50	2842.28	1150	3.41
4	Denudational Origin-Moderately Dissected Hills and Valleys	6.27	1549.61	627	1.86
5	Waterbodies	3.57	881.49	357	1.06
6	Denudational Origin-Low Dissected Hills and Valleys	3.54	874.92	354	1.05
7	Anthropogenic Origin-Anthropogenic Terrain	1.75	433.44	175	0.52
8	Structural Origin-Moderately Dissected Upper Plateau	1.67	413.21	167	0.50
Total		337.03	83281.80	33703	100.00

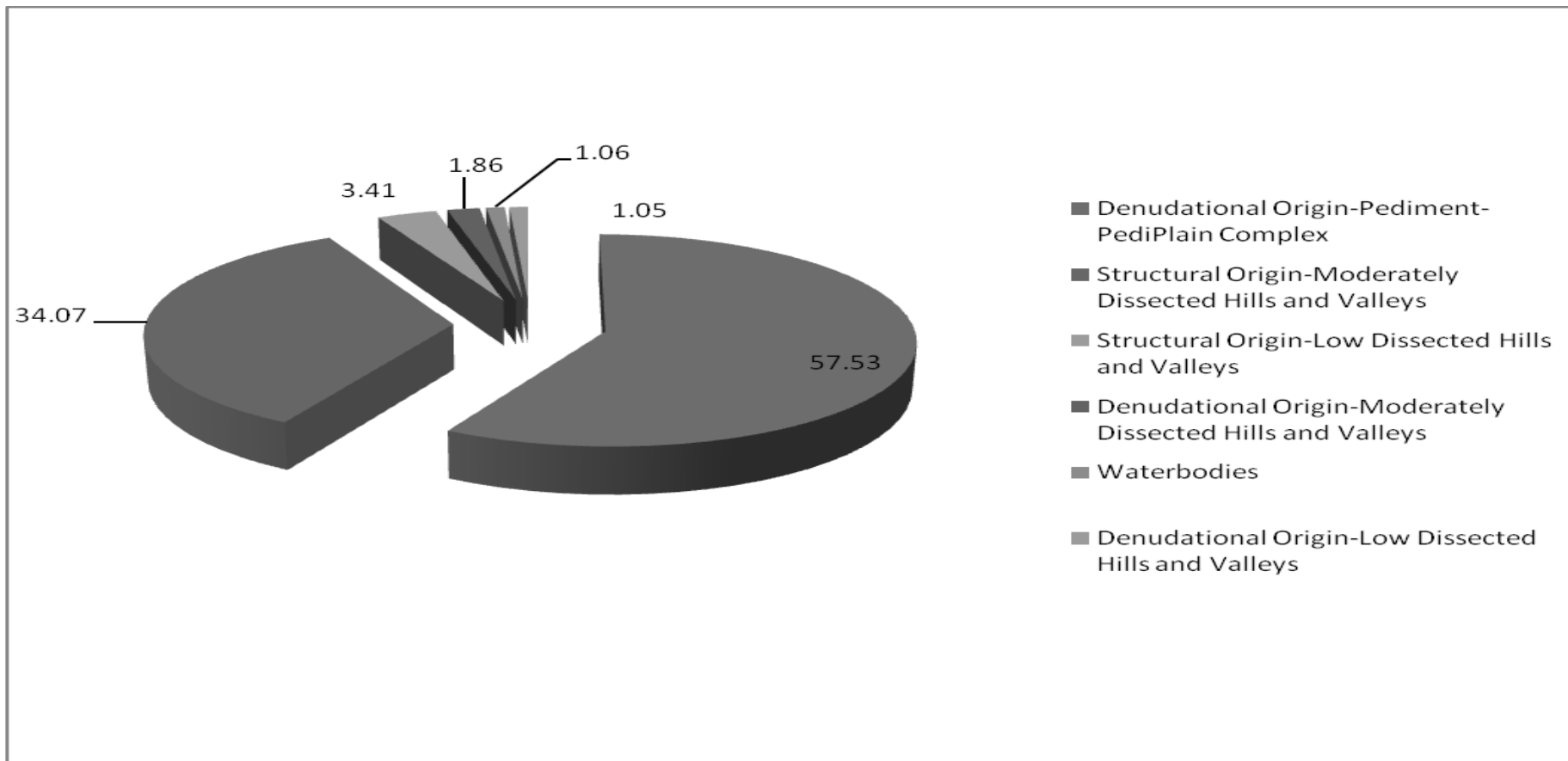


Figure 3-11 Geomorphology pattern of the study area

Geomorphology Map of Dharmapuri District

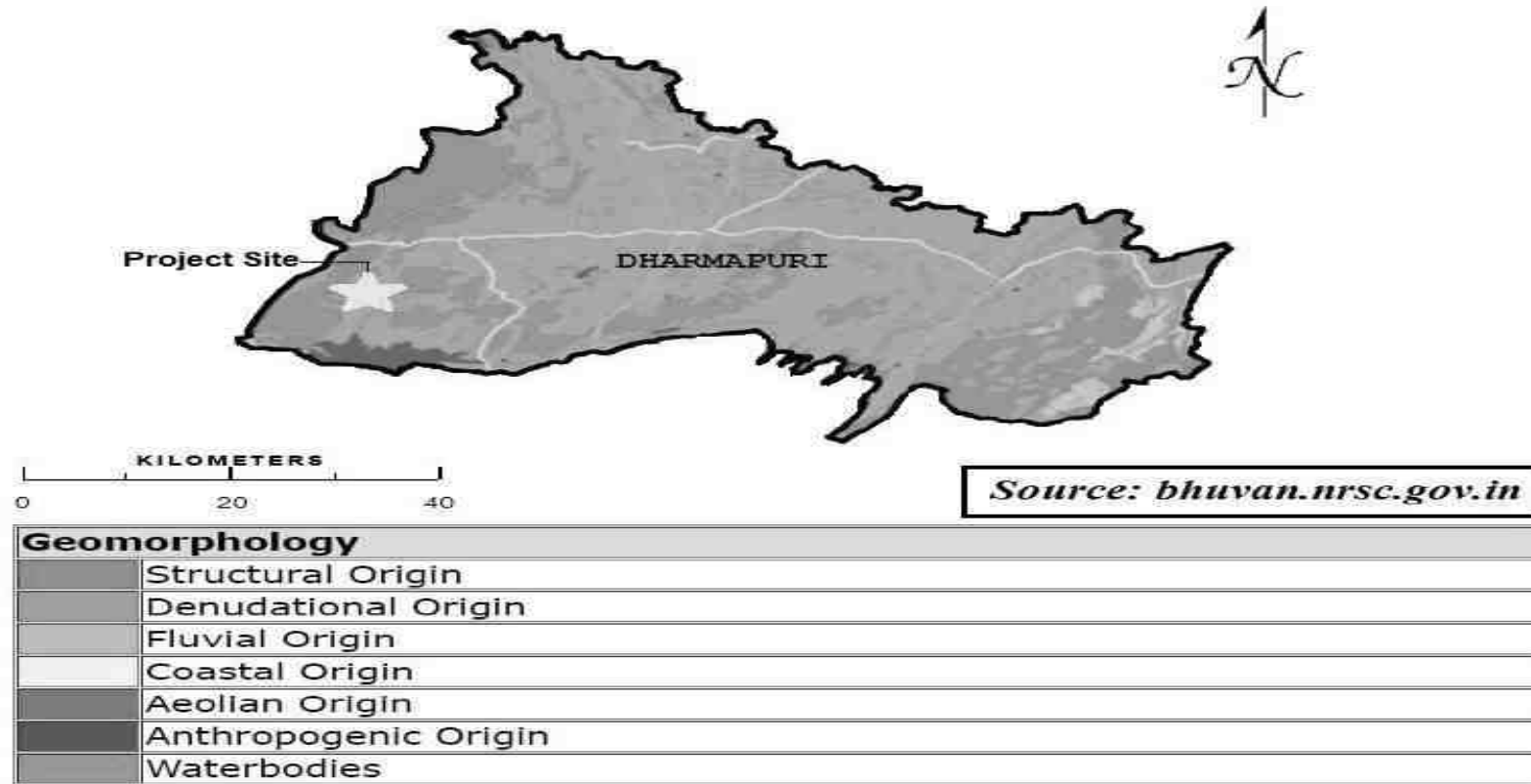


Figure 3-12 Geomorphology Map of the study area

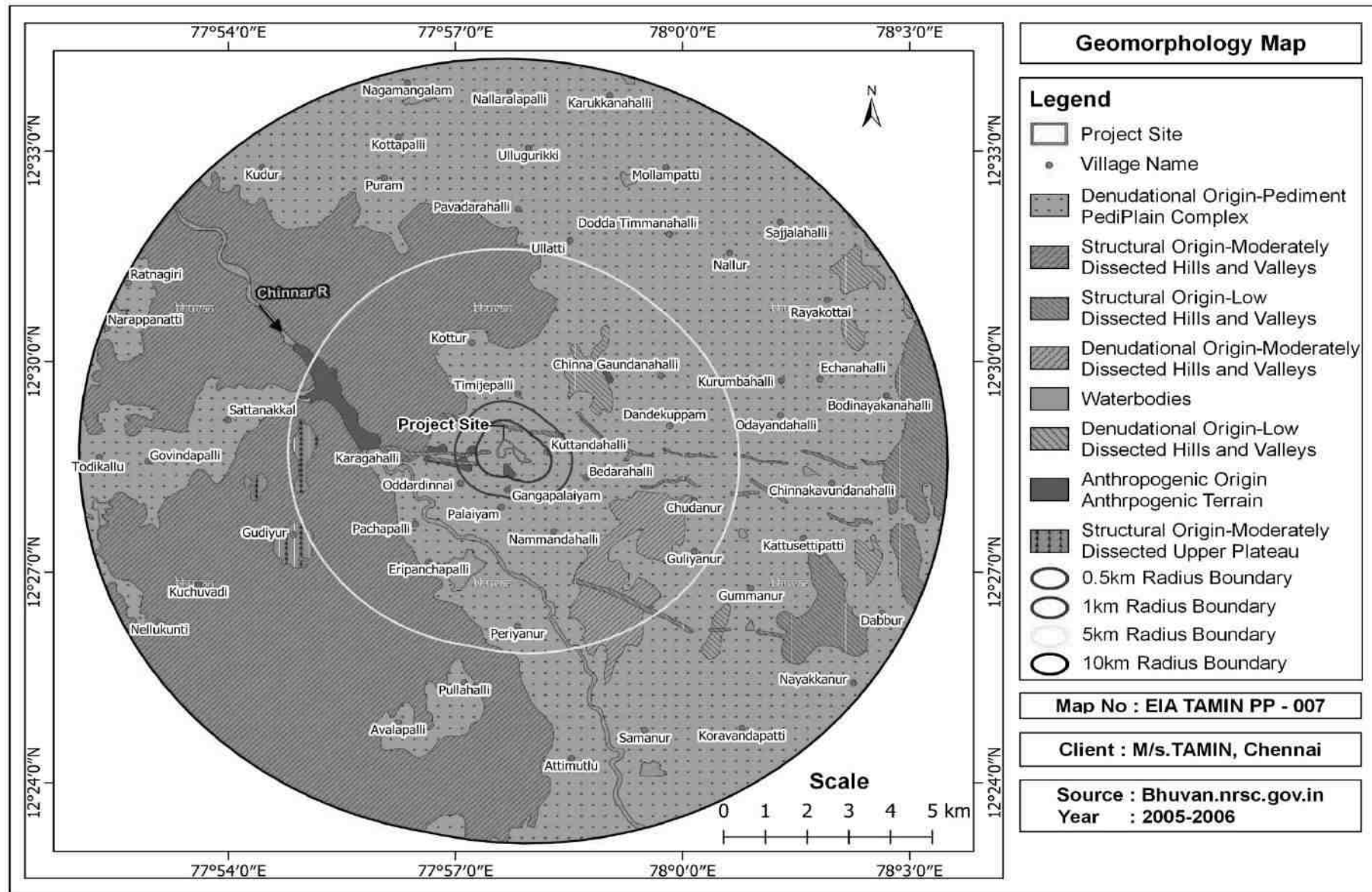


Figure 3-13 Geomorphology Map of Study Area

3.5.7 Hydrogeology of PIA District Profile

The depth to water level in the district varied between 5.27 and 16.70 m bgl during pre-monsoon (Plate-III) and varied between 2.47 and 11.32m bgl during post monsoon (Plate-IV). The seasonal fluctuation shows a rise in water level, which ranges from 3.71 to 7.06m bgl. The piezometric head varied between 2.66 to 20.06m bgl (May 2006) during pre monsoon and 1.19 to 14.57 m bgl during post monsoon. The hydrogeology map of Dharmapuri District is given in Figure 3-15.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/Dharmapuri.pdf

(Ref: District Groundwater Brochure Dharmapuri District, Tamil Nadu- Central Ground Water Board, October 2009)

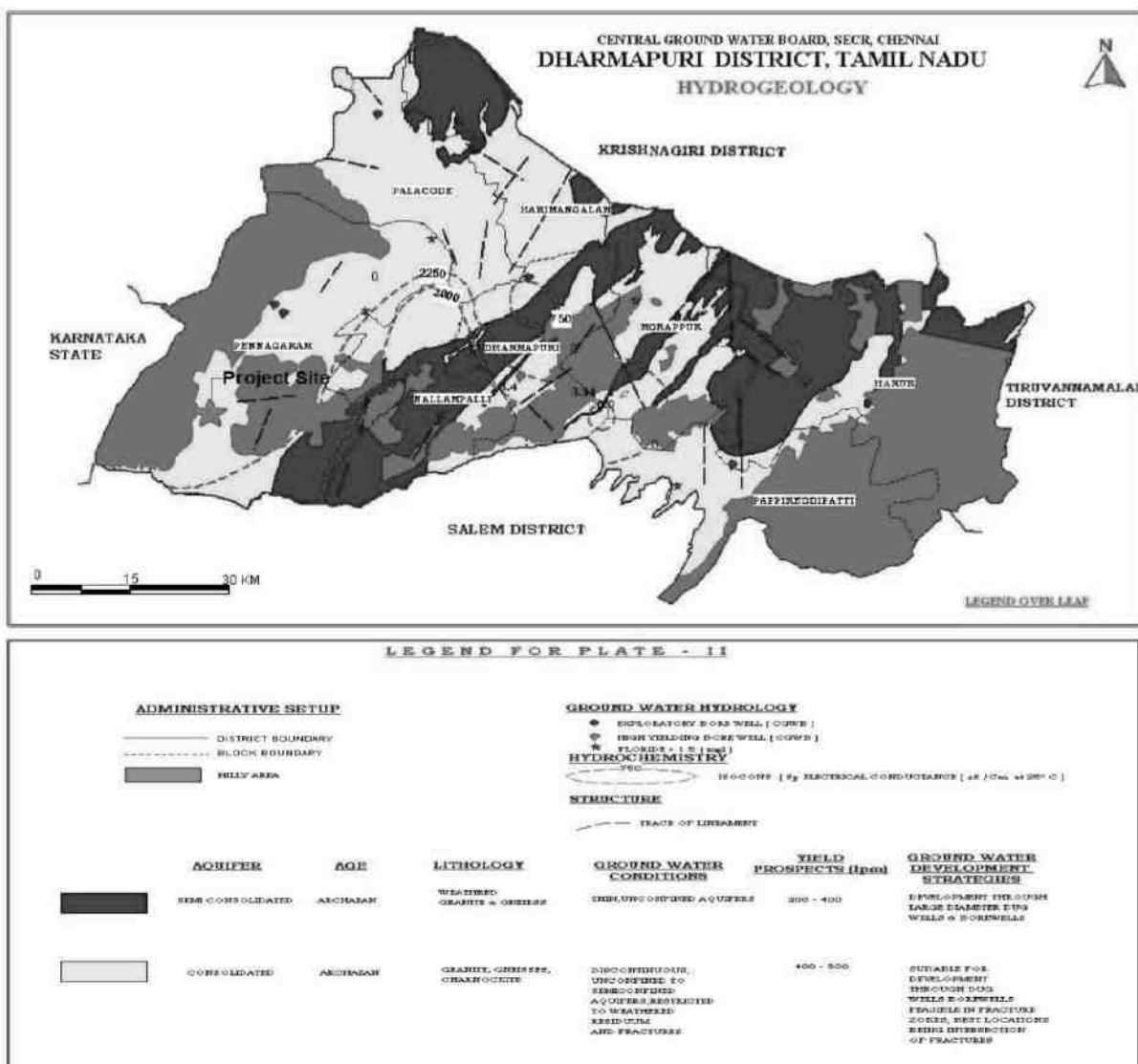


Figure 3-14 Hydrogeology Map of Thiruvallur District

3.5.8 Drainage Pattern in PIA District

Dharmapuri district is drained by Cauvery and Ponnaiyar rivers and their tributaries. Cauvery river flows along the south western boundary of the district. It flows in an easterly direction up to Bellgundla and then takes a more or less southerly course till it reaches the Stanley Reservoir. The Doddahalla and the Chinnar are important tributaries of Cauvery River in the district. Ponnaiyar is the major river draining the district and is ephemeral in nature. The drainage map of the Study Area is given as Figure 3-16.

Source:https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_D_CHB_DHARMAPURI.pdf .

(Ref: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A).

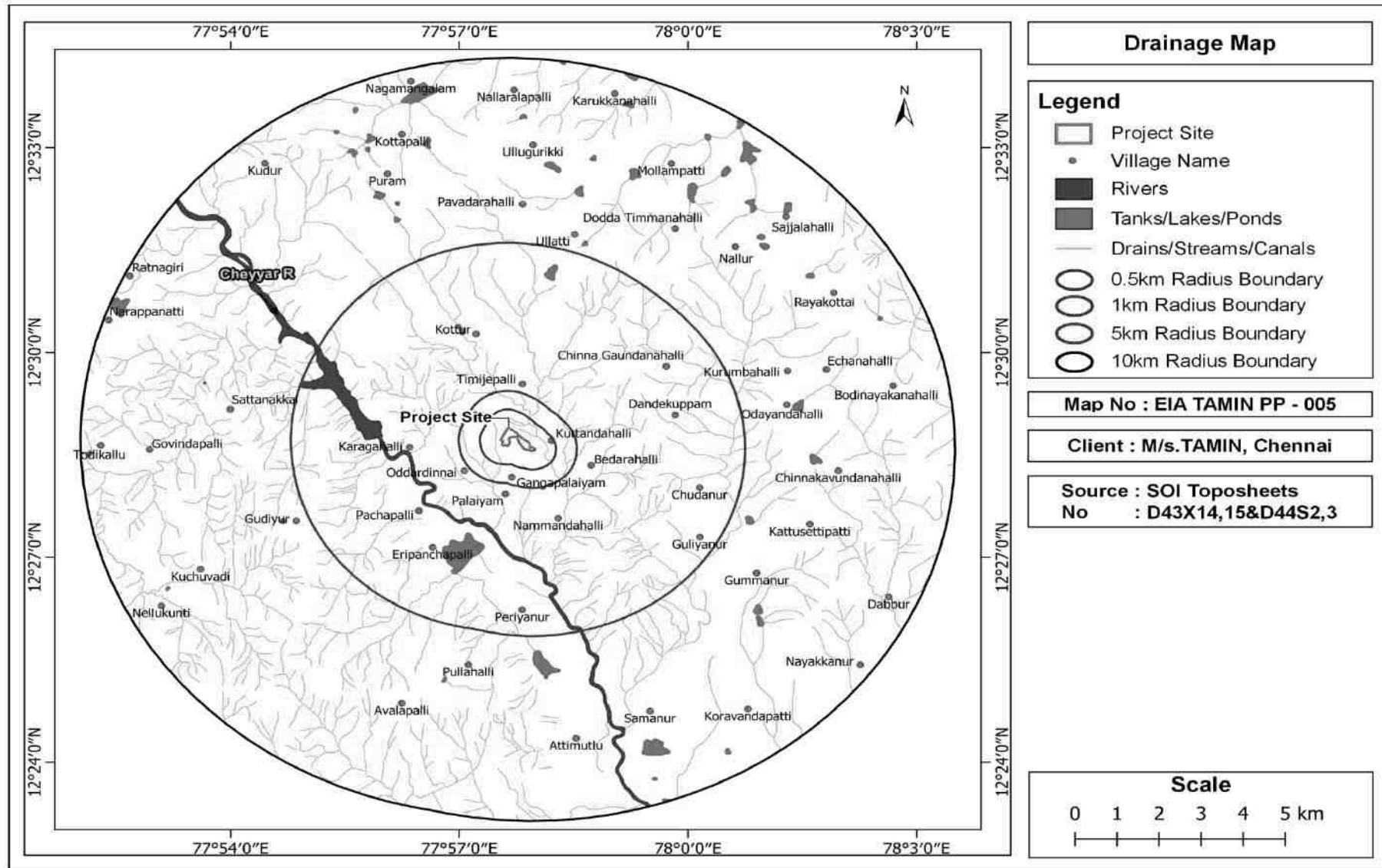


Figure 3-15 Drainage map of the study area

3.5.9 Geology

The geological formations of the district belong mainly to Archaean age along with rock of Proterozoic age. The former is represented by Khondalite Group of rocks, Charnockite Group of rocks, Migmatite Complex, Sathyamangalam Group of rocks, Bhavani Group of rocks and Kolar Alkaline rocks. The Alkaline Complex is represented by epidote-hornblende gneiss, ultramafics, syenite and carbonatite and these are distributed in the eastern part of the district. Innumerable basic dykes and felsites, quartz, barites and pegmatite veins form part of the Alkali Complex. Geology map of Tamil Nadu is given as Figure 3-17.

Source:

<https://cdn.s3waas.gov.in/s366368270ffd51418ec58bd793f2d9b1b/uploads/2019/06/2019060452.pdf>

(Ref: District Survey Report, Dharmapuri District, 2018)

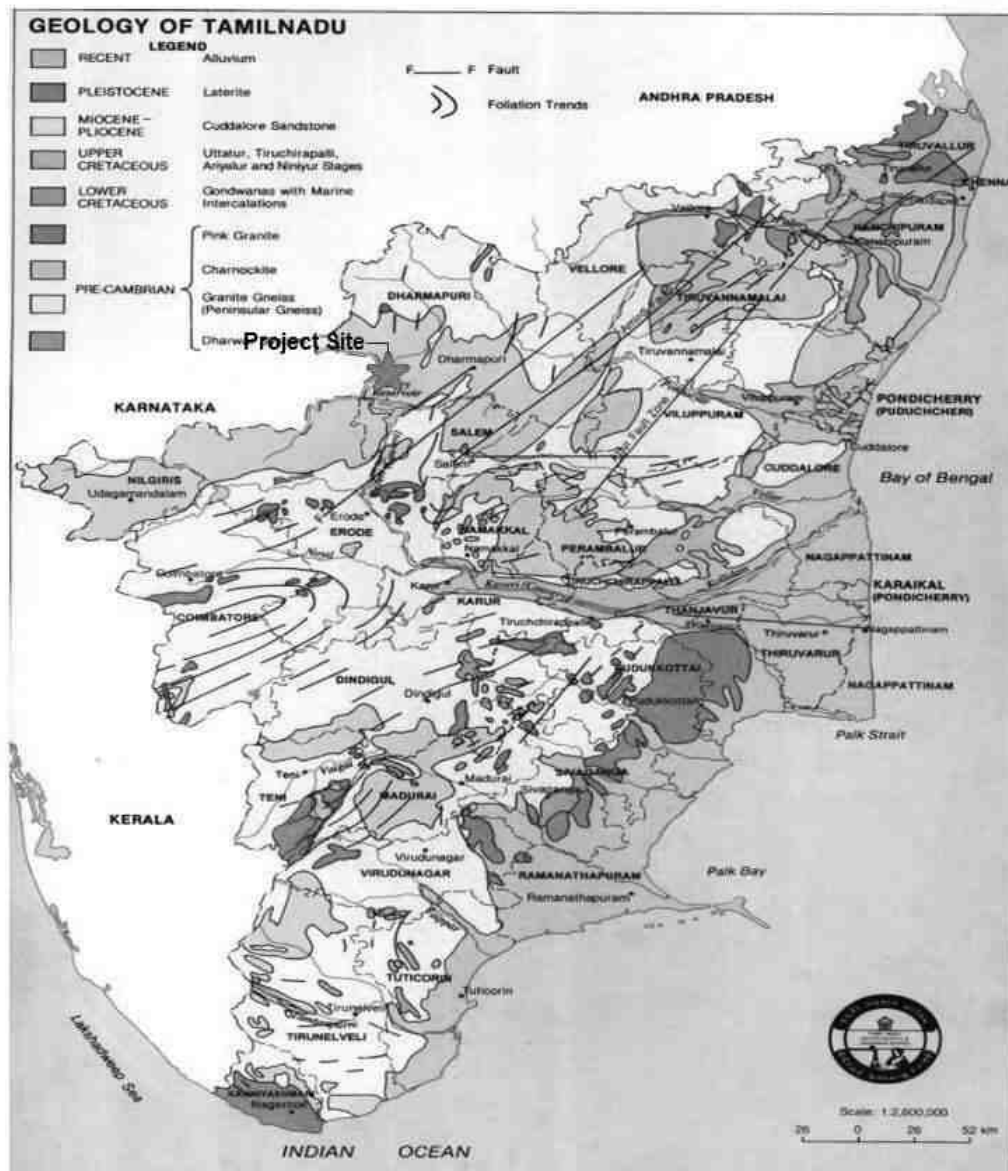
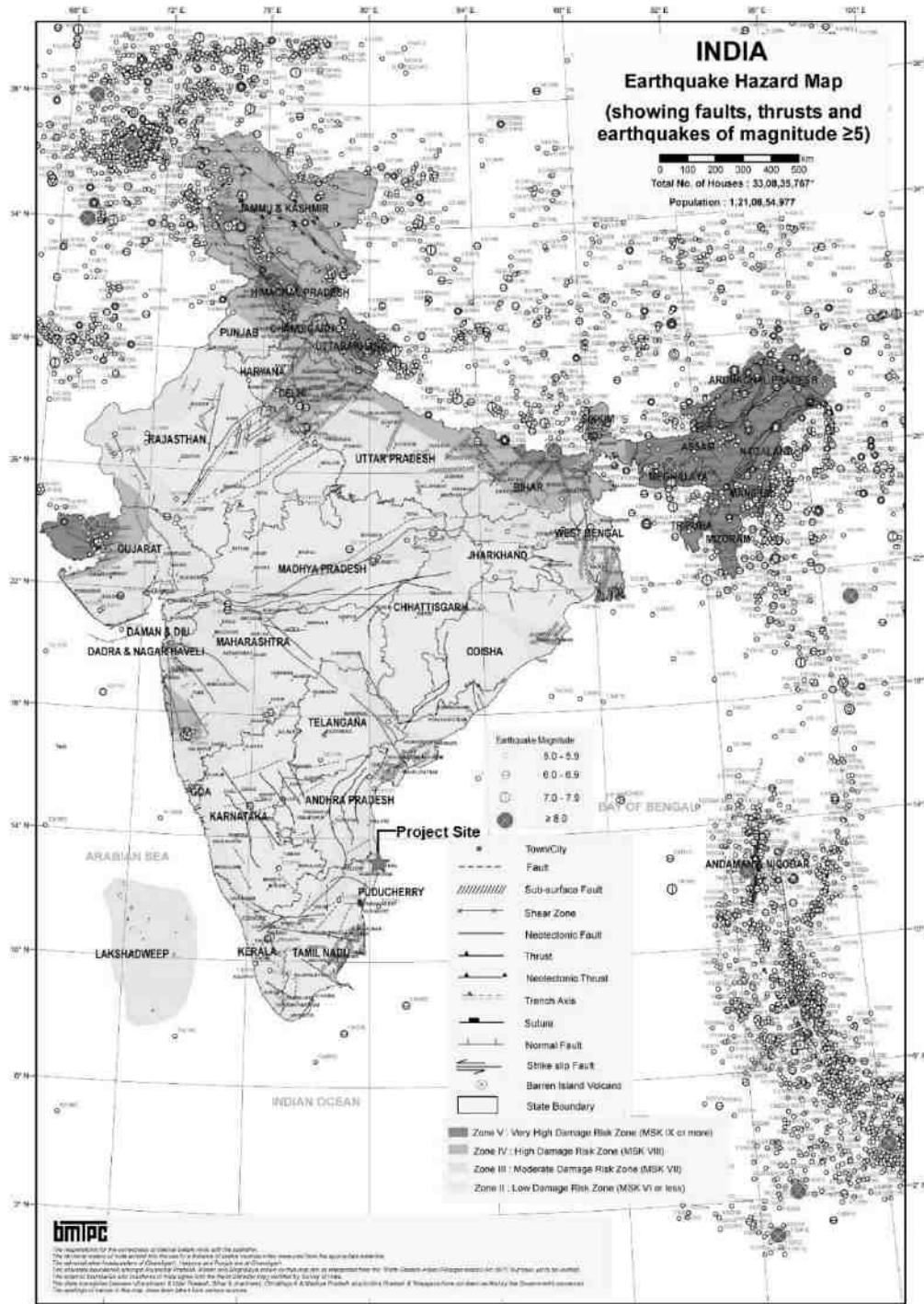


Figure 3-16 Geology Map of Tamilnadu

3.5.10 Seismicity

As per Vulnerability Atlas of Tamil Nadu-3rd Edition, the district falls in Zone II, III which is categorized as a Low Damage to Moderate Damage Risk Zone and project location/study area falls in Zone-II, which is categorized as Low damage risk zone. The seismicity map of Tamilnadu is shown in **Figure 3-18**.



BMTPC : Vulnerability Atlas - 3rd Edition : Peer Group, MoHA, GOI. Map is Based on digitized data of SOI. Seismic Zones of India Map IS 1893 (Part I): 2002. BIS: Earthquake Epicentre from IMD; Seismotectonic Atlas of India and its Environs, GSI. Houses/Population as per Census 2011, *Houses including vacant & locked houses. Disclaimer: The maps are solely for thematic presentation.

Figure 3-17 Seismicity Map of India

3.5.11 Soils in PIA District

The district has a wide range of soil types. In general, the soil in the district is quite loose and fresh with its colour varying from red to dark brown. The soils are mostly in-situ in nature, lateritic, earthy and pale reddish in colour. The soil has low nitrogen and phosphate content with marked variations between different taluks. Different types of the soils such as black or mixed loams, red ferruginous and gravel are found in the district. The black or red loam is very fertile due to its moisture absorbing character, which is found in Dharmapuri taluk. Red and sandy soil are seen in Harur taluk. Lateritic and sandy coastal alluvium soils are found in almost all blocks. Considerable stretches of good loam and black soil are found in Dharmapuri district. Soil map of India is given in **Figure 3-19**.

S. No	Type of Soil	Places in the District
1.	Lateritic Soil	Harur
2.	Black Soil	Dharmapuri, Palacode, Pappireddipatti
3.	Sandy Coastal Alluvium	Dharmapuri, Harur, Palacode
4.	Red Sandy Soil	Pennagaram, Palacode, Harur

Source: District Statistical Handbook, 2010-11

Source:https://censusindia.gov.in/nada/index.php/catalog/1146/download/3598/DH_2011_3329_PART_A_DCHB_DHARMAPURI.pdf .

(Ref: Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Dharmapuri District”,Series-34 Part XII-A).

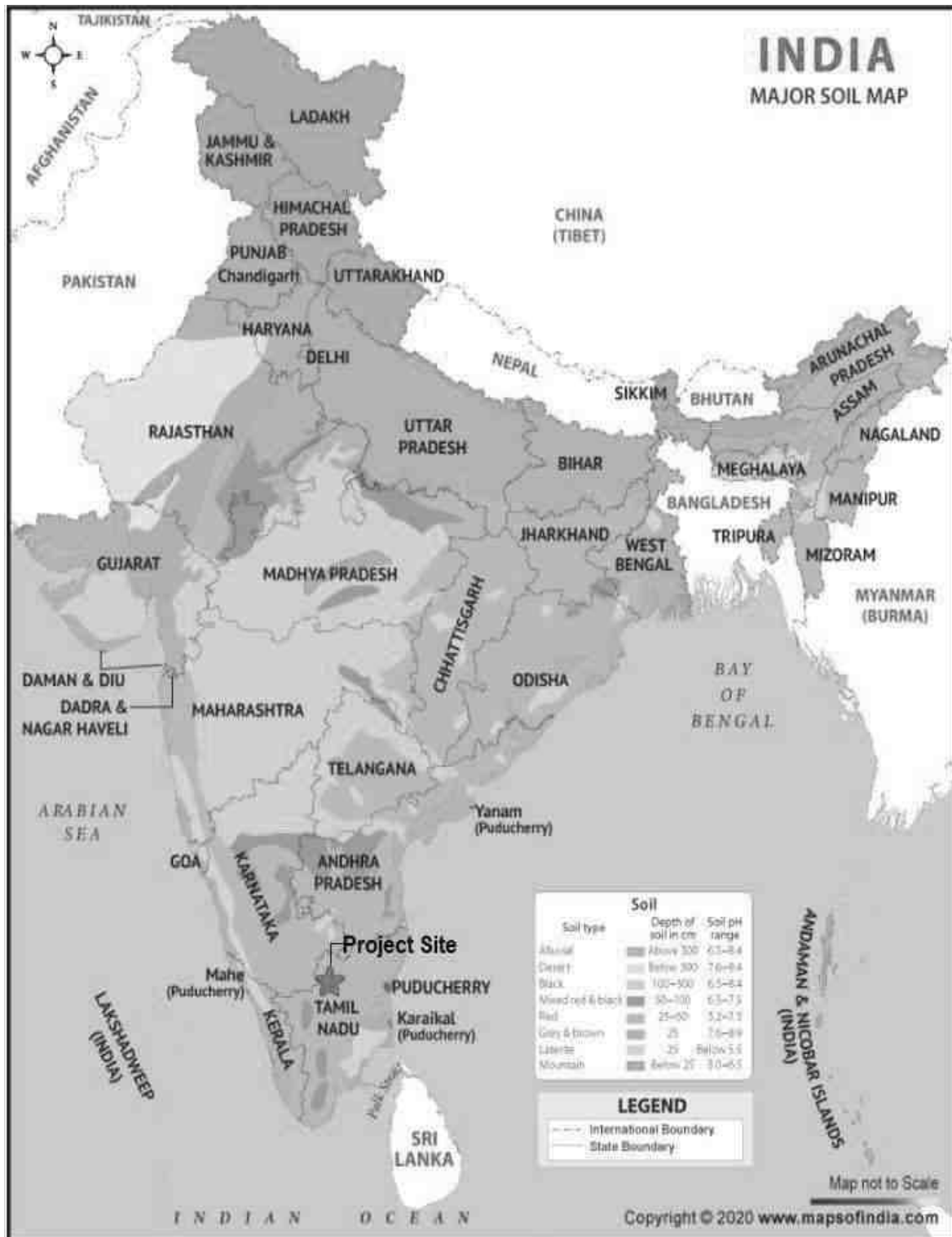


Figure 3-18 Soil map of India

3.5.12 Natural Hazards in PIA District

As per Tamil Nadu wind hazard map Dharmapuri district falls under three zones namely, High Damage Risk Zone ($V_b=47\text{m/s}$), Moderate Damage Risk Zone-B ($V_b=39\text{m/s}$) and Low Damage Risk Zone ($V_b=33\text{m/s}$) of wind and Cyclone. Wind hazard map of Tamil Nadu given in **Figure 3-20**.



BMTPC: Vulnerability Atlas - 3rd Edition, Floor Group: MCHHA; Map is Based on digitized data of GOI, GOI Basic Wind Speed Map National Building Code 2010, Cyclone Data, 1991-2015, IMD, GOI, Houses/Population as per Census 2011; *Houses including vacant & locked Houses.Disclaimer: The maps are solely for illustrative presentation.

Figure 3-19 Wind hazard Map of India

3.6 Establishment of Baseline for valued environmental components

3.6.1 Air Environment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. Significant changes, in predominant winds and weather conditions are observed in winter, summer and post-monsoon seasons apart from the local topographic influences. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance programme

3.6.2 Meteorological Conditions

The regional air quality is influenced by the meteorology of that region. The principal weather parameters that influence the concentration of the air pollutants in the surroundings are wind speed, wind direction and temperature. The meteorological data is useful for proper interpretation of the baseline data.

3.6.3 Meteorological Data Collection

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data was generated during the study period Mid of January 2023 to mid of April 2023 .The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) i.e. IS:8829 and Indian Meteorological Department (IMD).

3.6.4 General Meteorological Scenario based on IMD Data

The nearest Indian Meteorological Department (IMD) station located to project site Dharmapuri. The Climatological data of Dharmapuri (12° 08' N and 78o 02'E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30 year period (1991-2020), is presented in the following sections on the meteorological conditions of the region. The monthly variations of the relevant meteorological parameters are reproduced in **Table 3-8**.

Table 3-5 Climatological Summary– Chennai (Minambakkam) (1991-2020)

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
Jan	29.7	17.7	2.6	0.3	81	50	20.1	18.1	5.1	NE	E
Feb	32.7	18.9	2.3	0.2	75	41	20.9	17.9	5	NE	E
Mar	35.8	20.8	16.4	0.9	68	33	22.3	17.3	4.6	NE	E
Apr	36.8	23.8	52.9	2.8	68	38	25.5	20	4.3	SW	E
May	36.5	24.5	120.3	6.6	66	48	25.9	23.5	5.3	SW	SW
Jun	34.2	23.9	71.8	3.9	67	52	24.7	23.3	6.7	SW	SW
Jul	33.2	23.4	73.9	4.1	69	56	24.2	23.3	6.8	SW	SW
Aug	32.5	23.1	113.9	6.2	73	58	24.2	23.5	6.2	SW	SW
Sep	32.3	22.6	143.5	7	76	61	24.5	24	4.7	SW	SW
Oct	30	21.9	193.2	9.7	82	71	25	24.9	3.7	NE	E
Nov	29	20.4	110.9	6.5	83	69	25.6	25.6	4.3	NE	E
Dec	27.9	18.3	40.3	2.7	82	62	23.7	23.4	4.8	NE	E
Max.	36.8	24.5	193.2	9.7	83	71	25.9	25.6	6.8	Annual Predominant wind direction is North East	
Min.	27.9	17.7	2.3	0.2	66	33	20.1	17.3	3.7		
Annual Avg/Total.	32.7	21.6	942	50.8	74	53	23.6	21.8	5.1		

As per the above IMD climatological Data given in

Table 3-5,the observations drawn are as follows

- Highest Daily maximum temperature is 36.8oC and the Lowest daily minimum temperature is 17.7oC were recorded in the months of May and January respectively
- Maximum and minimum relative humidity of 83% and 33% were recorded in the months of November and March respectively.
- Maximum and minimum rainfall of 193.2mm and 2.3mm was recorded in the months of October and February respectively.
- Maximum and minimum Mean wind speed is 6.8 Km/hr and 3.7 Km/hr was recorded in the months of July and October respectively. Annual Wind predominant direction is North East.

3.6.5 Meteorological data during Study Period

The meteorological scenario in and around the project site is an essential requirement during study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period Mid of January 2023 to mid of April 2023 and is presented in Table 3-6. The wind rose for the study period is given as Figure 3-20.

Table 3-6 Meteorology Data for the Study Period (January 2023 to March 2023)

S. No	Parameter	Observation
1	Temperature	Max. Temperature: 34°C Min. Temperature: 14°C Avg. Temperature: 25.08°C
2	Average Relative Humidity	52.51%
3	Average Wind Speed	3.12 m/s
4	Predominant Wind Direction	E

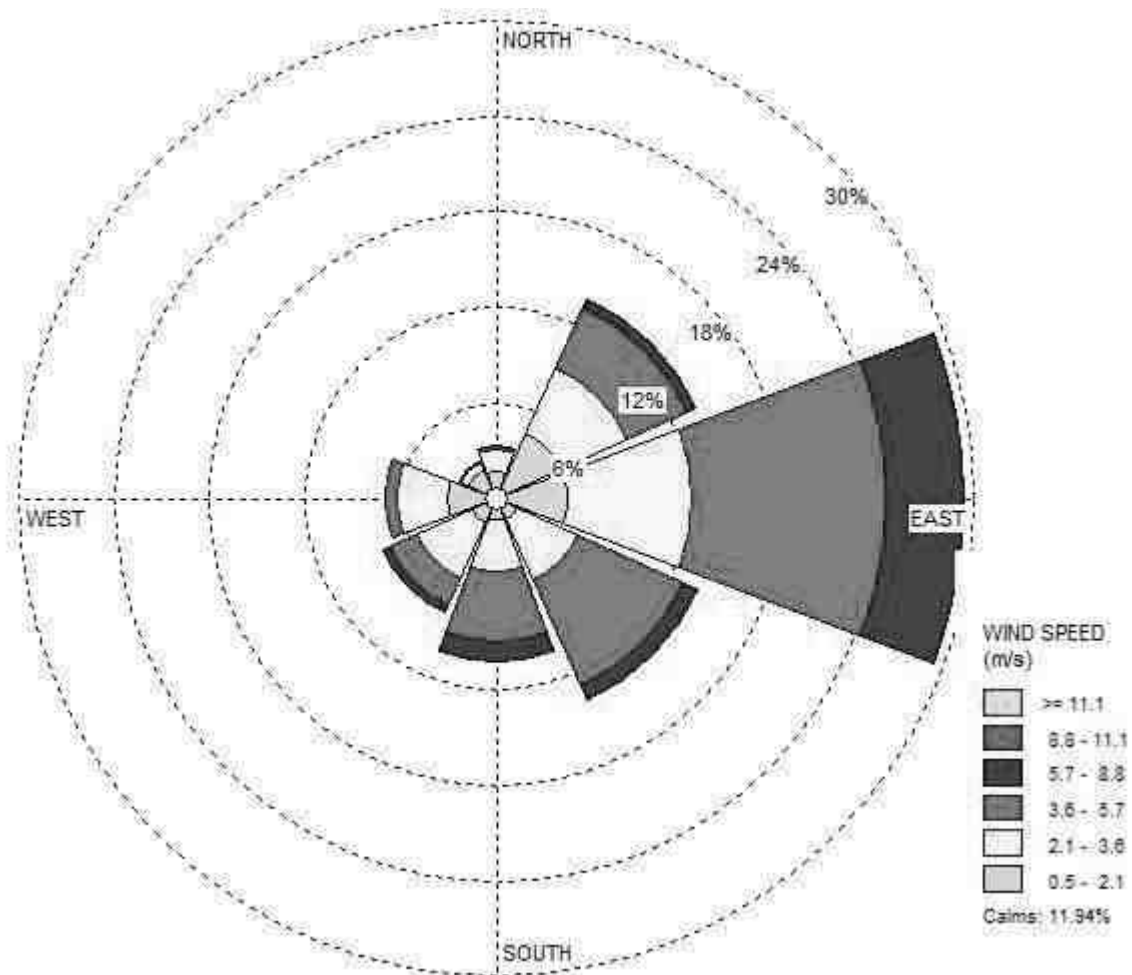


Figure 3-20 Wind Rose during Mid of January 2023 to mid of April 2023

3.6.6 Atmospheric Inversion

Atmospheric inversion level at the project site was monitored; the results observed at the site during the study period are as follows

- Average atmospheric temperature: 25.08°C
- Average Relative humidity:52.51%
- Average Wind speed:3.12 m/s

The daily inversion level calculated based on the average temperature and average wind speed at the project site and the maximum inversion height is derived by the graph plotted based on the average temperature and average wind speed. The daily inversion level at the project site varies from 50 to 3747 m during 6 AM to 4 PM, the maximum recorded at 3747 m during March 2022.

This is shown in the following Figure 3-21.

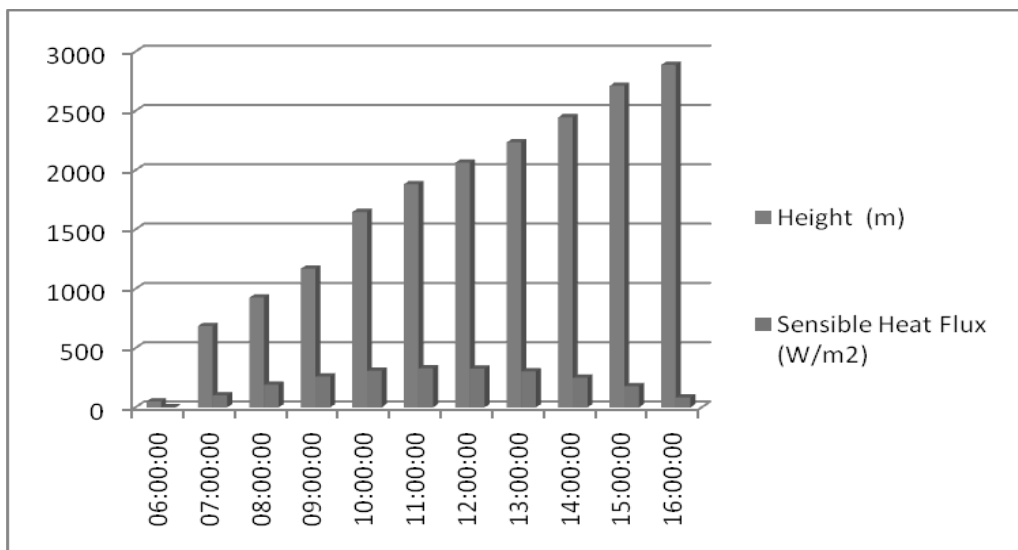


Figure 3-21 Atmospheric inversion level at the project site

3.7 Ambient Air Quality

The selection criteria for monitoring locations are based on the following:

- Topography/Terrain
- Meteorological conditions
- Residential and sensitive areas within the study area
- Representatives of regional background air quality/pollution levels and
- Representation of likely impacted areas

3.7.1 Ambient Air Quality Monitoring Stations

To evaluate the baseline air quality of the study area, Eight (08) monitoring locations have been identified as per Meteorological data during the study period (Mid of January 2023 to Mid of April 2023). The Annual wind predominance is from West to East. AAQ monitoring locations are selected

based on Annual wind predominance, map showing the air monitoring locations is given in **Figure 3-22** and the details of the locations are given in

Table 3-7.

Table 3-7 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind	Distance (km) from Project boundary	Azimuth Directions
AAQ1	Near project site	c/w	0.05	N
AAQ2	Chinna Gaundanahalli	u/w	3.89	NE
AAQ3	Bedarahalli	c/w	1.41	ESE
AAQ4	Guliyannur	c/w	4.59	ESE
AAQ5	Periyanur	c/w	4.25	S
AAQ6	Panchapalli	d/w	2.52	SW
AAQ7	Oddardinnai	d/w	1.11	SW
AAQ8	Kottur	c/w	2.55	NNW

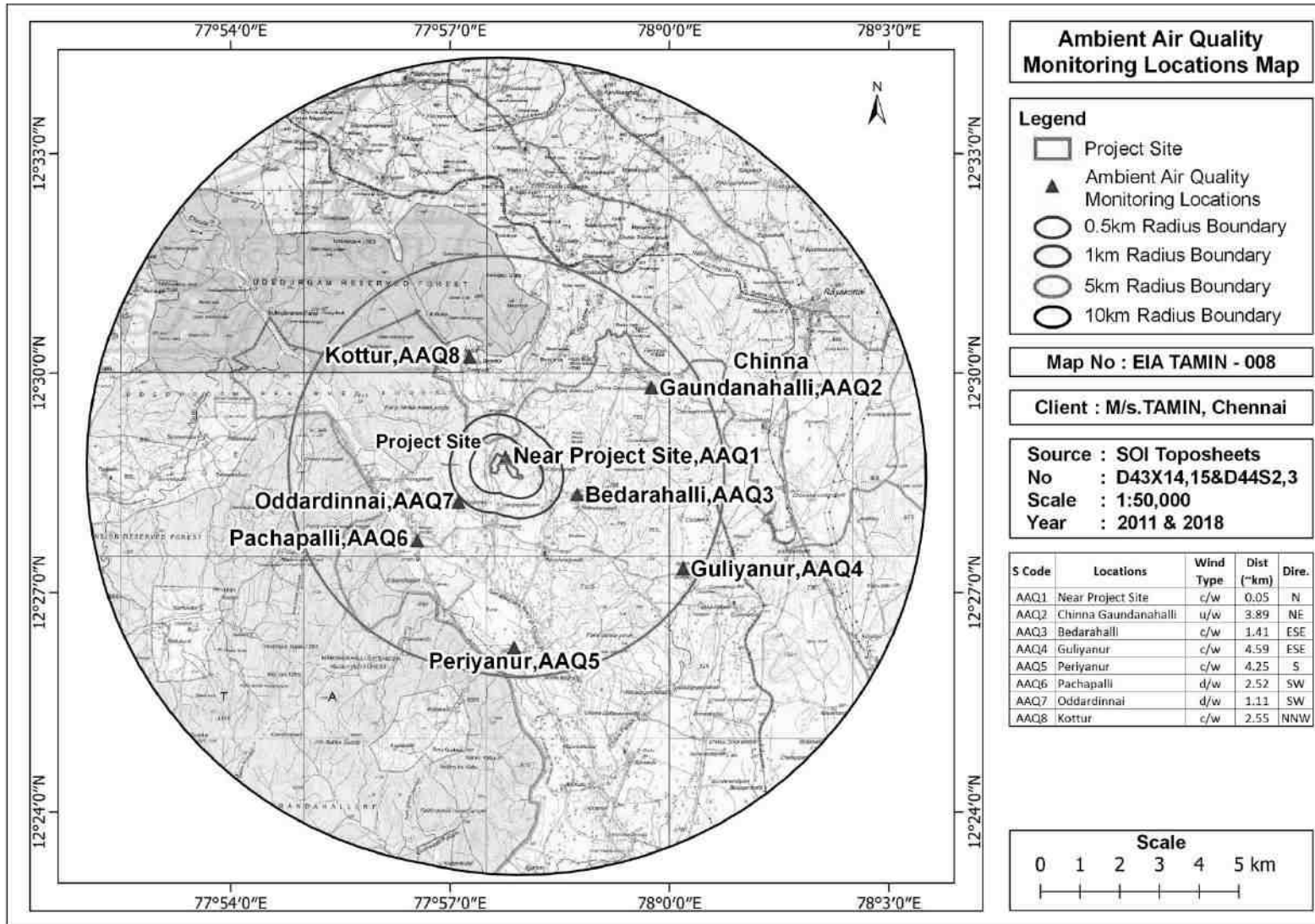


Figure 3-22 Map showing the Ambient Air Quality monitoring locations

3.7.2 Ambient Air Quality Monitoring Techniques and Frequency

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. 3 months (Mid of January 2023 to Mid of April 2023). PM10, PM2.5, SO₂, NO_x, Pb, NH₃, C₆H₆, C₂₀H₁₂, As, Ni and Free Silica were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in **Table 3.11**.

Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters

S.No	Parameters	Analytical method	NAAQ standards: 2009		Sampling Time
1.	Sulphur Dioxide (SO ₂), µg/m ³	IS:5182(Part-2):2001 (Reaff:2006)	50 (Annual)	80(24 Hours)	24 Hours
2.	Nitrogen Dioxide (NO ₂), µg/m ³	IS: 5182 (Part - 6): 2006	40 (Annual)	80 (24 Hours)	24 Hours
3.	Particulate Matter (PM _{2.5}), µg/m ³	IS: 5182 (Part - 23): 2006	40 (Annual)	60 (24 hours)	24 Hours
4.	Particulate Matter (PM ₁₀), µg/m ³	IS:5182 (Part– 23): 2006	60 (Annual)	100 (24 hours)	24 Hours
5.	CO mg/m ³	IS:5182(Part–10):1999 (Reaff:2006)	2 (8 hours)	4 (1hour)	8 Hours
6.	Pbµg/m ³	IS:5182(Part–22):2004 (Reaff:2006)	0.5(Annual)	1(24 hours)	24 Hours
7.	O ₃ , µg/m ³	IS: 5182 (Part – 9): 1974	100(8hours)	180 (1hour)	8 Hours
8.	NH ₃ , µg/m ³	APHA(air) 2nd edition (Indophenol-blue method)	100(Annual)	400(24 hours)	8 Hours
9.	Benzene, µg/m ³	IS:5182(Part–11):1999 (RA:2009)	5 (Annual)	5 (Annual)	24 Hours
10.	Benzo (a) pyrene, ng/m ³	IS:5182(Part–12):2004 (RA:2009)	1 (Annual)	1 (Annual)	24 Hours
11.	Arsenic, ng/ m ³	APHA (air) 2nd edition	6 (Annual)	6 (Annual)	24 Hours
12.	Nickel ng/ m ³	In house method (AAS method) based on CPCB guidelines volume 1	20(Annual)	20(Annual)	24 Hours
13.	Free Silica	NIOSH Manual- Method 7601	--	--	8 hours

3.7.3

3.7.4 Results and Discussions

The variations of the pollutants PM₁₀, PM_{2.5}, SO₂, NO₂, CO, Pb, O₃, NH₃, C₆H₆, C₂₀ H₁₂, As and Ni are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November, 2009. Ambient Air Quality Monitoring Data (June 2021 to August 2021) for



the study area is given in **Table 3-9** and trends of measured ambient concentration in the study area were graphically represented in **Figure3-23**.

Table 3-9 Summary of the average baseline concentrations of pollutants

Parameters	Conc.	NAAQ Standards	Project Site	Gaundana halli	Bedarahalli	Guliyannur	Periyannur	Panchapalli	Oddardinnai	Kottur
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
PM10 Conc. ($\mu\text{g}/\text{m}^3$)	Min.	100 (24 Hours)	40.36	28.03	34.47	38.38	27.25	42.81	30.82	33.86
	Max		57.52	39.95	49.12	54.70	38.84	61.01	43.92	48.25
	Avg.		48.41	33.62	41.34	46.03	32.69	51.34	36.96	40.61
	98th 'tile		57.19	39.72	48.84	54.39	38.62	60.66	43.67	47.97
PM2.5 Conc. ($\mu\text{g}/\text{m}^3$)	Min.	60 (24 Hours)	26.29	18.99	22.89	25.16	18.61	28.95	20.88	21.63
	Max		37.46	27.06	32.62	35.85	26.53	41.26	29.76	30.83
	Avg.		31.52	22.77	27.45	30.17	22.32	34.72	25.05	25.95
	98th 'tile		37.24	26.90	32.43	35.65	26.37	41.02	29.59	30.65
SO2 Conc. ($\mu\text{g}/\text{m}^3$)	Min.	80 (24 Hours)	9.40	8.15	9.47	9.15	7.67	10.16	7.05	7.64
	Max		13.40	11.61	13.49	13.04	10.92	14.48	10.04	10.89
	Avg.		11.28	9.78	11.36	10.98	9.20	12.19	8.46	9.17
	98th 'tile		13.32	11.55	13.42	12.97	10.86	14.40	9.99	10.83
NO2 Conc. ($\mu\text{g}/\text{m}^3$)	Min.	80 (24 Hours)	22.19	17.86	22.78	20.73	18.30	23.91	17.11	18.53
	Max		31.62	25.45	32.46	29.55	26.08	34.08	24.38	26.41
	Avg.		26.61	21.42	27.32	24.87	21.95	28.68	20.52	22.22
	98th 'tile		31.43	25.31	32.27	29.38	25.93	33.88	24.24	26.25
Pb ($\mu\text{g}/\text{m}^3$)	Avg.	1 (24 hour)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)
CO (mg/m3)	Avg.	4 (1hour)	0.51	0.172	0.38	0.42	0.19	0.64	0.28	0.32
O3 ($\mu\text{g}/\text{m}^3$)	Avg.	180 (1hour)	11.92	9.71	10.11	10.23	9.16	12.49	10.19	10.94
NH3 ($\mu\text{g}/\text{m}^3$)	Avg.	400 (24)	7.14	6.9	7.84	7.16	6.57	7.34	6.21	6.49



Parameters	Conc.	NAAQ Standards	Project Site	Gaundana halli	Bedarahalli	Guliyannur	Periyannur	Panchapalli	Oddardinnai	Kottur
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
		hours)								
Benzene (µg/m ³)	Avg.	5 (Annual)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Benzo (a) pyrene, (ng/m ³)	Avg.	1 (Annual)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Arsenic (ng/ m ³)	Avg.	6 (Annual)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)
Nickel (ng/m ³)	Avg.	20 (Annual)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)
Free Silica (µg/m ³)	Avg	-	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)

Note: BLQ (Below the Limit of Quantification), LOQ (Limit of Quantifications)

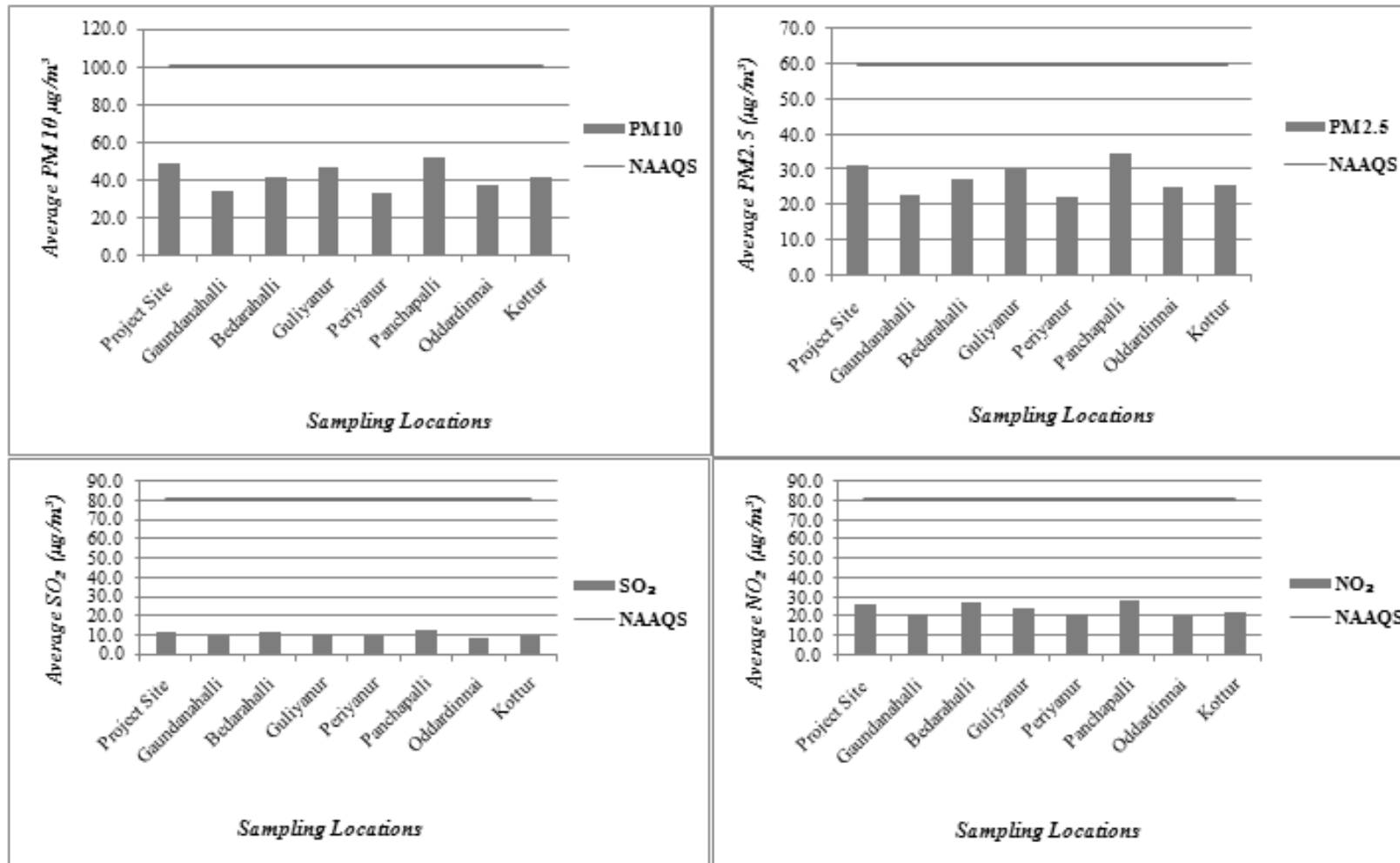


Figure3-23 Trends of Measured Ambient Concentrations in the Study Area

3.7.5 Observations

The ambient air quality has been monitored at 8 locations for 12 parameters as per CPCB guidelines within the study area. The average baseline levels of PM10 are 32.69 $\mu\text{g}/\text{m}^3$ to 51.34 $\mu\text{g}/\text{m}^3$, PM2.5 is 22.32 $\mu\text{g}/\text{m}^3$ to 34.72 $\mu\text{g}/\text{m}^3$, SO₂ is 8.46 $\mu\text{g}/\text{m}^3$ to 12.19 $\mu\text{g}/\text{m}^3$, NO₂ is 20.52 $\mu\text{g}/\text{m}^3$ to 28.68 $\mu\text{g}/\text{m}^3$ and CO is 0.172 mg/m^3 to 0.64 mg/m^3 all the parameters are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period from Mid of Jan 2023 to Mid of April 2023.

3.8 Noise Environment

The prevailing ambient noise level at a particular location is nothing but the resultant (total) of all kinds of noise sources existing at various distances around that location. The ambient noise level at a location varies continuously depending on the type of surrounding activities. Ambient noise levels have been established by monitoring noise levels at Eight (08) locations in and around 10Km distance from project area during the study period using precision noise level meter. The noise monitoring locations in the study area were selected after giving due consideration to the various land use categories. The land use categories include commercial, residential, rural and sensitive areas. Noise levels were recorded on an hourly basis for one complete day at each location using pre-calibrated noise levels. A map noise showing the noise monitoring locations is given in **Figure 3-24**.

3.8.1 Results and Discussions

Based on the recorded hourly noise levels at each monitoring location, the day equivalent (L_d) and night equivalent (L_n) were calculated;

- L_d: Average noise levels between 6:00 hours to 22.00 hours.
- L_n: Average noise levels between 22:00 hours to 6.00 hours.

The comparison of day equivalent noise levels (L_d) and night equivalent noise levels (L_n) with the respective CPCB stipulated noise standards for various land use categories are shown in the **Table 3-10**.

Table 3-10 Day and Night Equivalent Noise Levels

S. No	Location	Location Code	Distance (km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
					Day	Night	L _{day} (L _d)	L _{Night} (L _n)	
1.	Near project site	N1	Within the site		54.8	44.6	75	70	Industrial
2.	Chinna Gaundanahalli	N2	3.89	NE	50.6	42.7	55	45	Residential
3.	Bedarahalli	N3	1.41	ESE	52.3	41.9	55	45	Residential
4.	Guliyannur	N4	4.59	ESE	53.6	43.7	55	45	Residential
5.	Periyanur	N5	4.25	S	53.9	42.9	55	45	Residential



S. No	Location	Location Code	Distance (km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
					Day	Night	Lday (Ld)	LNight (Ln)	
6.	Panchapalli	N6	2.52	SW	54.1	42.4	55	45	Residential
7.	Oddardinnai	N7	1.11	SW	51.8	40.9	55	45	Residential
8.	Kottur	N8	2.55	NNW	50.7	40.2	55	45	Residential

3.8.2 Observations

The observations of day equivalent and night equivalent noise levels at all locations are given below

- In Industrial areas day time noise levels was about 54.8 dB(A) and 44.6 dB(A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In Residential areas day time noise levels varied from 50.6 dB(A) to 54.1 dB(A) and night time noise levels varied from 40.2 dB(A) to 43.7dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels is within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Night time).

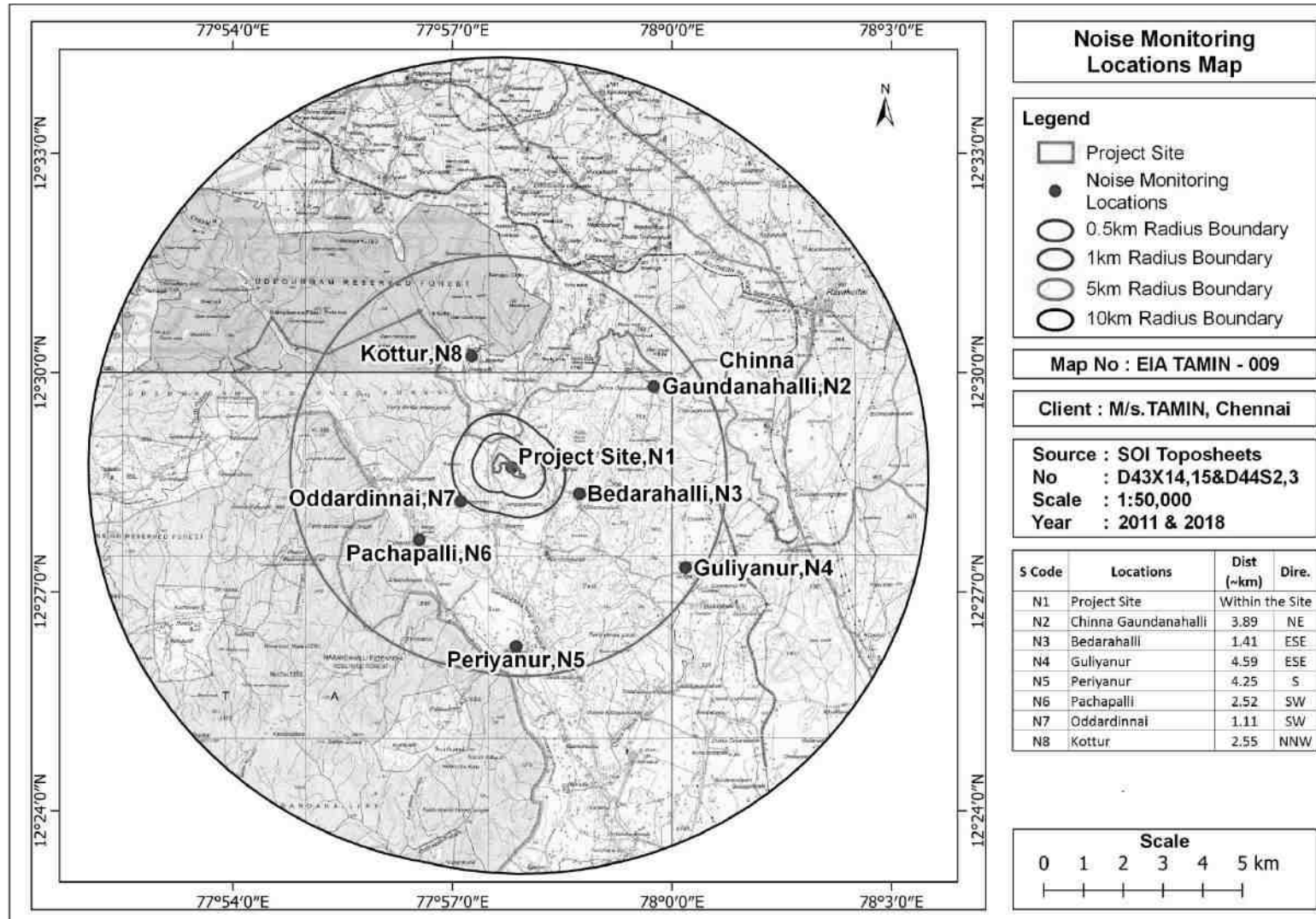


Figure 3-24 Map showing the noise monitoring locations

3.9 Water Environment

3.9.1 Surface Water Quality Assessment

Dharmapuri district is drained by Cauvery and Ponnaiyar rivers and their tributaries. Cauvery river flows along the south western boundary of the district. It flows in an easterly direction up to Bellgundla and then takes a more or less southerly course till it reaches the Stanley Reservoir. The Doddahalla and the Chinnar are important tributaries of Cauvery river in the district. Ponnaiyar is the major river draining the district and is ephemeral in nature. It originates from Nandhi hills in Karnataka, enters Tamil Nadu west of Bagalur and flows almost in a south easterly direction till it reaches Daddampatti from where it takes an easterly course. Pambar, Vaniyar and Kallar are the important tributaries of Ponnaiyar draining the eastern part of the district whereas the Chinnar and Markandeya Nadhi drain the northern part of the district.

Source:

https://censusindia.gov.in/2011census/dchb/DCHB_A/33/3329_PART_A_DCHB_DHARMAPURI.pdf

(Ref: Directorate of Census Operations Tamil Nadu, “The District Census Handbook 2011, Dharmapuri District”, Series-34, Part XII-A).

3.9.2 Surface Water Resources

To establish the baseline status of water environment, the representative sampling locations for surface water within a radial distance of 10 km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters is given in

Table 3-11.

Table 3-11: Test methods used for the analysis of water quality parameters

S. No	Parameter Measured	Test Method
1.	Colour	IS:3025 (Part- 4) 1983 (Reaff 2006)
2.	Turbidity	IS 3025(Part - 10):1984
3.	pH	IS:3025 (Part - 11): 1983 (Reaff: 2006)
4.	Conductivity	IS:3025 (Part - 14): 1983 (Reaff: 2006)
5.	Total Dissolve Solids	IS:3025:1(Part - 16) 1984 (Reaff 2006)
6.	Total Suspended Solids	IS 3025 (Part - 17) 1984 (Reaff 1996)
7.	Alkalinity as CaCO ₃	IS:3025,1 (Part - 23) 1986 (Reaff 2009)
8.	Total Hardness as CaCo ₃	IS:3025 (Part - 21) 1983 (Reaff 2006)
9.	Sodium	IS:3025,5(Part - 45) 1993 (Reaff 2006)
10.	Potassium	IS:3025,5(Part - 45) 1993 (Reaff 2006)

S. No	Parameter Measured	Test Method
11.	Calcium as Ca	IS 3025 (Part - 40):1991
12.	Magnesium as Mg	IS 3025 (Part - 46) 1994
13.	Chloride	IS 3025 (Part - 32):1988
14.	Sulphate SO ₄	IS 3025(Part - 24):1986
15.	Nitrate as NO ₃	ASTM(Part - 31)1978
16.	Phosphate	IS 3025 (Pt 45) 1993 (R 2006)
17.	Fluorides as F	IS 3025 (Part - 60):2008
18.	Cyanide	IS 3025 (Part-27):1986
19.	Arsenic	IS 3025:(Part-37):1988(Reaff 2009)
20.	Boron	IS:3025 (Part - 57):2003
21.	Cadmium	IS 3025 (Part - 41)1991
22.	Chromium, Total	IS:3025 (Part - 52) 2003 (Reaff 2009)
23.	Copper	IS:3025 (Part - 42)1992 (Reaff: 2009)
24.	Iron	IS 3025 (Part - 53):2003
25.	Lead	IS:3025 (Part - 47) 1994 (Reaff 2009)
26.	Manganese	IS 3025:(Part - 59):2006
27.	Mercury	IS 3025 (Part48):1994 RA 1999
28.	Nickel	IS 3025:(Part-54):2003(Reaff 2009)
29.	Selenium	IS 3025 Part (56)2003
30.	Zinc	IS:3025 (Part - 49) 1994 (Reaff 2009)
31.	Dissolved Oxygen	IS:3025 (Part - 38)1989 (Reaff 2009)
32.	BOD	5210B APHA22nd Edn 2012
33.	COD	IS:3025 (Part-58)-2006

The prevailing status of surface water quality has been assessed during the study period. Surface water quality results are provided in Table 3-12. A map showing the surface water monitoring locations is given in **Figure 3-25**.

Table 3-12: Details of Surface water sampling locations

S. No	Water bodies	Location code	Distance from project boundary (~Km)	Direction from project boundary
1.	Koppagarai Lake	SW1	9.44	NE
2.	Dhul chetti Lake	SW2	4.88	ENE
3.	Odayandahalli Lake	SW3	6.23	E
4.	Chitra Pallam u/s	SW4	5.07	ESE
5.	Chitra Pallam d/s	SW5	6.57	SSE
6.	Chinnar R d/s	SW6	6.05	SSE
7.	Eripanchapalli Lake	SW7	3.25	SSW
8.	Chinnar R u/s	SW8	2.21	W

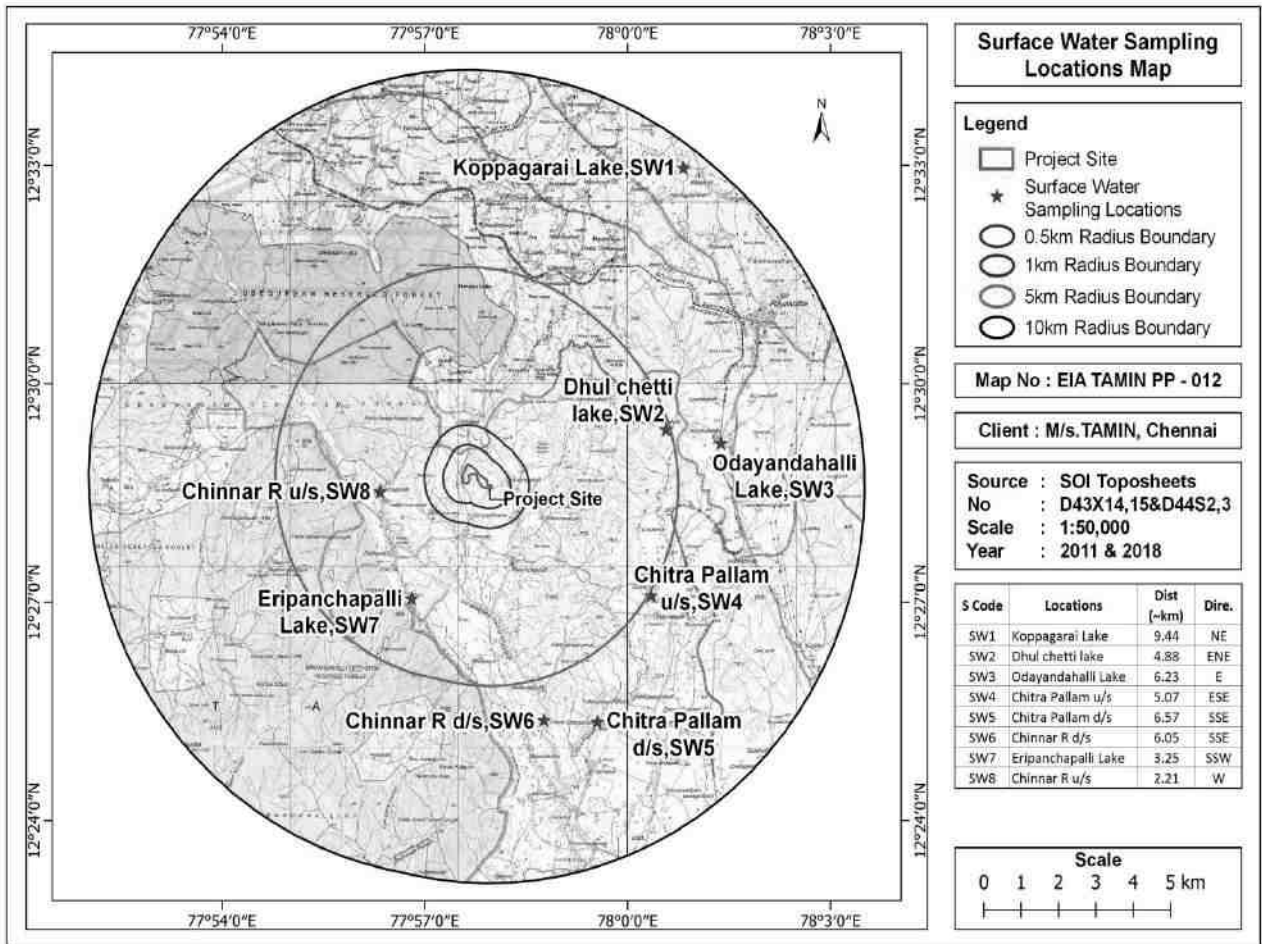


Figure 3-25 Map showing the surface water monitoring locations

Table 3-13 Surface Water Monitoring Results

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	Koppaga rai Lake	Dhul chetti Lake	Odayand ahalli Lake	Chitra Pallam u/s	Chitra Pallam d/s	Chinnar R d/s	Eripanch apalli Lake	Chinnar R u/s
				SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
1.	Turbidity	NTU	1	4.1	6.2	3.7	4.7	5.3	6.1	2.7	3.8
2.	pH (at 25°C)	--	6.5-8.5	7.31	7.54	7.91	7.11	7.29	7.5	7.99	7.42
3.	Electrical Conductivity	µS/cm	--	749`	824	784	801	922	697	933	724
4.	Total Dissolved Solids	mg/l	500	431	567	496	501	527	593	617	609
5.	Total Suspended Solids	mg/l	--	31	29	46	19	27	19	12	21
6.	Total Alkalinity as CaCO3	mg/l	--	124	139	118	132	146	128	139	137
7.	Total Hardness as CaCO3	mg/l	300	209	284	174	191	246	112	154	298
8.	Sodium as Na	mg/l	--	79.2	51.4	36.7	49.6	71.5	72.8	51.2	29.2
9.	Potassium as K	mg/l	--	3.1	6.7	2.9	5.8	3.4	10.1	5.4	5.4
10.	Calcium as Ca	mg/l	--	41.7	84.6	45.1	35.8	51.7	39.7	61.2	57.9
11.	Magnesium as Mg	mg/l	--	10.1	21.6	19.7	22.8	25.9	24.6	33.7	38.1
12.	Chloride as Cl	mg/l	250	101.9	126.7	45.8	96.3	111.5	123.4	149.8	128.2
13.	Sulphate as SO4	mg/l	400	39.1	55.2	29.7	53.8	51.6	47.8	51.9	61.3
14.	Nitrate as NO3	mg/l	20	3.9	3.7	5.2	2.7	1.9	4.1	5.7	4.9
15.	Phosphate as PO4	mg/l	--	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)	BLQ(LO Q 0.02)
16.	Fluorides as F	mg/l	1.5	0.31	0.29	0.43	0.41	0.11	0.19	0.51	0.13
17.	Cyanide as CN	mg/l	0.05	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
18.	Arsenic as As	mg/l	0.05	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
19.	Boron as B	mg/l	-	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)
20.	Cadmium as Cd	mg/l	0.01	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	Koppa rai Lake	Dhul chetti Lake	Odayand ahalli Lake	Chitra Pallam u/s	Chitra Pallam d/s	Chinnar R d/s	Eripanch apalli Lake	Chinnar R u/s
				SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
				Q 0.001)	Q 0.001)	Q 0.001)	Q 0.001)	Q 0.001)	Q 0.001)	Q 0.001)	Q 0.001)
21.	Chromium, Total as Cr	mg/l	0.05	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
22.	Copper as Cu	mg/l	1.5	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
23.	Iron as Fe	mg/l	0.3	0.047	0.055	0.042	0.035	0.054	0.049	0.068	0.058
24.	Lead as Pb	mg/l	0.1	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
25.	Manganese as Mn	mg/l	0.5	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)
26.	Mercury as Hg	mg/l	0.001	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)	BLQ(LO Q 0.0005)
27.	Nickel as Ni	mg/l	-	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
28.	Selenium as Se	mg/l	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
29.	Zinc as Zn	mg/l	15	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)
30.	Dissolved Oxygen as DO	mg/l	6	5.4	6.1	5.2	6.3	5.9	6.2	6.5	5.7
31.	Chemical Oxygen Demand as O ₂	mg/l	-	22.7	19.5	18.6	28.4	21.2	33.1	17.4	17.2
32.	BOD, 3 days @ 27°C as O ₂	mg/l	2	7.6	6.9	6.1	8.94	6.52	10.5	5.91	6.73

(Note: BLQ – Below the Limit of Quantification; LOQ – Limit of Quantifications)

3.9.3 Results and Discussions

Surface water sample results are discussed below:

- pH in the collected surface water samples varies between 7.11 to 7.99 where all the samples are within the limit of IS 2296:1992
- The Total Dissolved Solids (TDS) value of collected surface water sample ranges from 431 mg/l to 617 mg/l.
- The Total hardness value of the collected surface water sample ranges between 112 mg/l to 298 mg/l.
- BOD value of the collected surface water sample ranges from 6.1 mg/l to 10.5 mg/l.
- COD value of collected surface water varies from 17.2 mg/l to 33.1 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se are within the limits of IS 2296:1992.

3.10 Ground Water Resources

The chemical characteristics of ground water in the phreatic zone in Dharmapuri district has been studied using the analytical data of ground water samples collected from Network Hydrograph Stations of Central Ground Water Board. The study of quality of ground water in deeper aquifers in the district has been attempted using the data collected from exploratory bore/tube wells constructed in the district. Ground water in phreatic aquifers in Dharmapuri district in general, is colourless, odourless and slightly alkaline in nature. Dharmapuri District Depth of Water Level on Pre-Monsoon & post Monsoon is given in **Figure 3-27**.

Source: http://cgwb.gov.in/District_Profile/TamilNadu/Dharmapuri.pdf

(Ref: District Groundwater Brochure-Dharmapuri District, Tamil Nadu- Central Ground Water Board, October 2009)

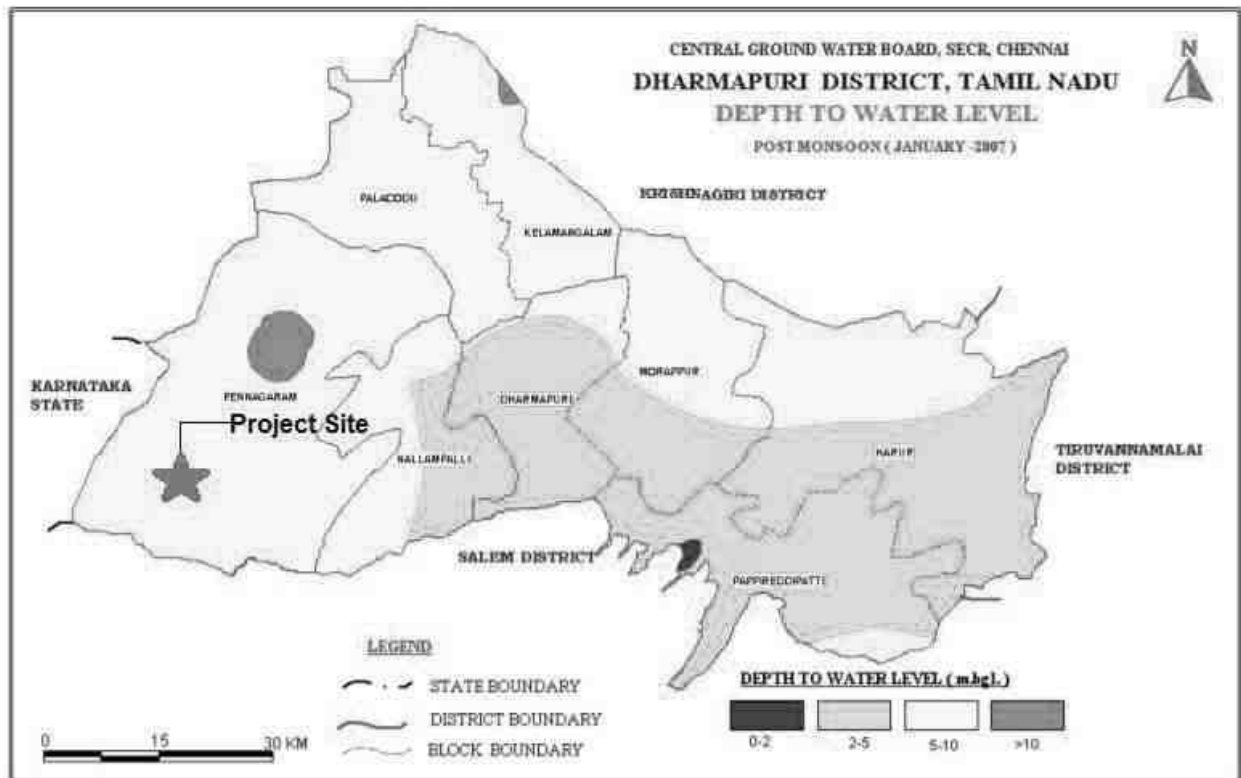
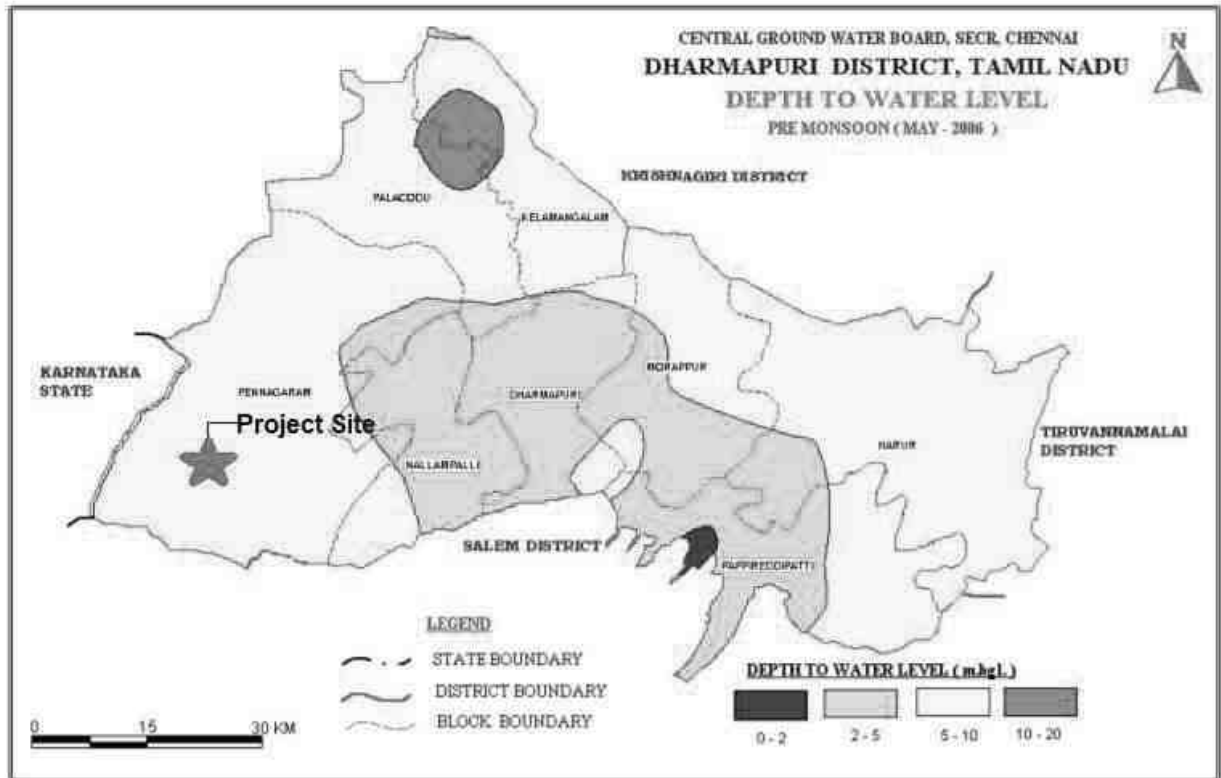


Figure 3-26 Depth to water level of Dharmapuri District

3.10.1 Groundwater Quality

Total Eight (08) ground water monitoring locations were identified for assessment in different villages around the project site based on the usage of sub surface water by the settlements/ villages in the study area. The groundwater results are compared with the acceptable and permissible water quality standards as per IS: 10500 (2012) for drinking water. Groundwater quality monitoring locations and results are given in

Table 3-14 and **Table 3-15**. A map showing the groundwater monitoring locations is given in **Figure 3-27**.

Table 3-14 Details of Groundwater Quality Monitoring Locations

Station Code	Location	Distance (km) from Project boundary	Azimuth Directions
GW1	Near project site	0.05	N
GW2	Chinna Gaundanahalli	3.89	NE
GW3	Bedarahalli	1.41	ESE
GW4	Guliyapur	4.59	ESE
GW5	Periyapur	4.25	S
GW6	Panchapalli	2.52	SW
GW7	Oddardinnai	1.11	SW
GW8	Kottur	2.55	NNW

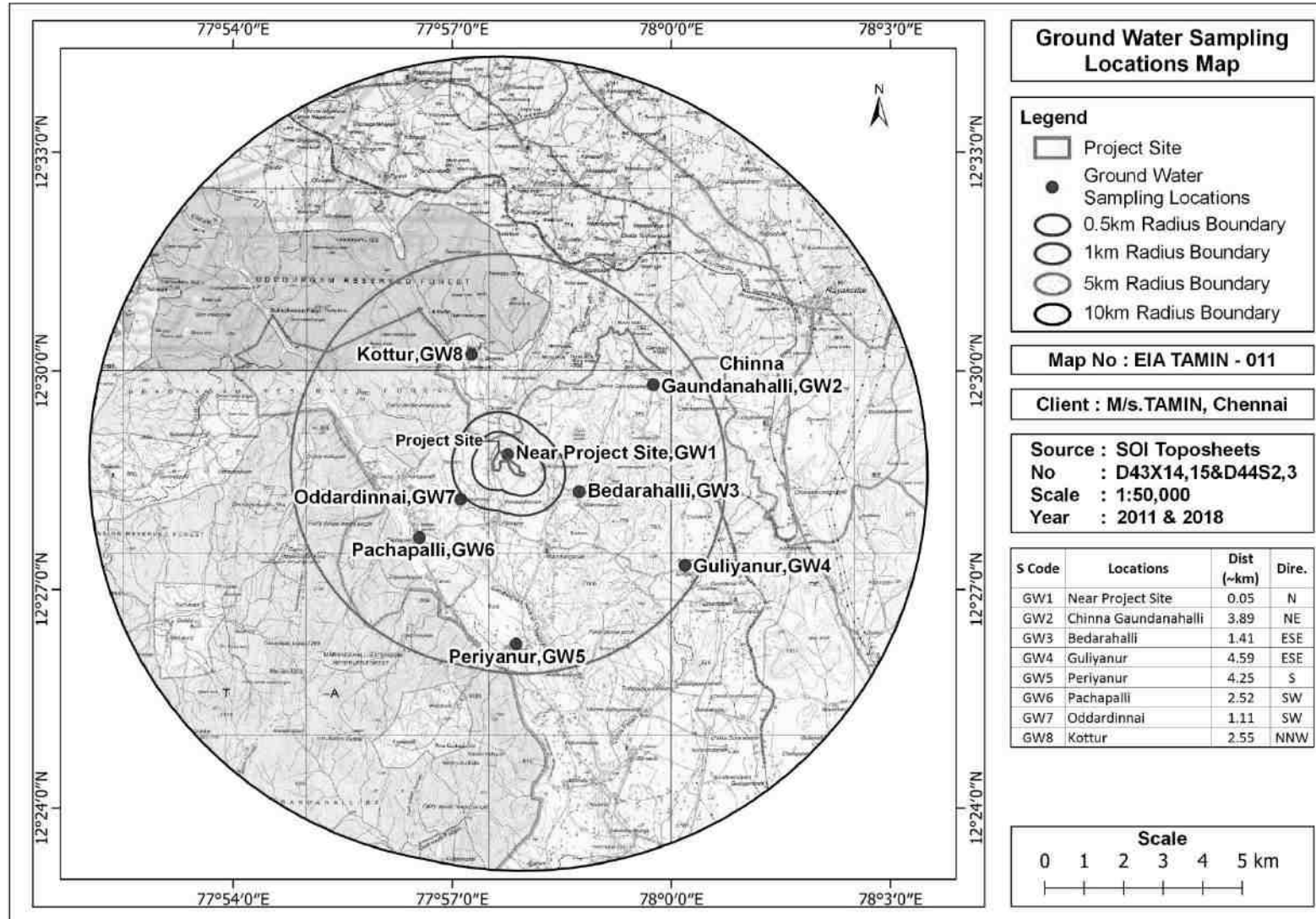


Figure 3-27 Map showing the groundwater monitoring locations

Table 3-15 Physico chemical analysis of Ground water samples from study

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Near Project Site	Chinna Gaundana halli	Bedaraha lli	Guliyanu r	Periyannur	Panchapalli	Oddardin nai	Kottur
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1.	Colour	Hazen	15	5	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)
2.	Turbidity	NTU	5	1	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)
3.	pH	--	NR	6.5-8.5	7.31	7.24	7.49	6.98	6.72	7.82	7.91	8.26
4.	Conductivity	µS/cm	--	--	784	1054	897	1126	1137	992	768	776
5.	Total Dissolve Solids	mg/l	2000	500	527	694	658	704	825	698	489	514
6.	Total Suspended Solids	mg/l	--	--	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)	BLQ(LO Q 1.0)
7.	Alkalinity as CaCO ₃	mg/l	600	200	147	184	197	204	179	186	154	143
8.	Total Hardness as CaCO ₃	mg/l	600	200	214	391	352	186	167	328	193	251
9.	Sodium as Na	mg/l	--	--	56.5	51.9	42.1	69.3	87.2	65.7	53.8	47.2
10.	Potassium as K	mg/l	--	--	3.9	5.2	4.1	3.2	2.7	5.1	4.9	3.7
11.	Calcium as Ca	mg/l	200	75	42.7	65.7	72.1	51.2	45.8	62.3	39.7	52.2
12.	Magnesium as Mg	mg/l	100	30	17.9	22.4	18.1	25.6	41.3	35.2	28.7	21.2

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Near Project Site	Chinna Gaundana halli	Bedaraha lli	Guliyanu r	Periyannur	Panchapalli	Oddardina i	Kottur
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
13	Chloride as Cl	mg/l	1000	250	95.1	111.8	84.2	110.7	145.7	126.4	74.64	101.9
14	Sulphate SO ₄	mg/l	400	200	45.3	61.7	48.1	55.8	45.4	69.9	27.6	51.2
15	Nitrate as NO ₃	mg/l	NR	45	6.5	5.8	7.2	2.9	3.7	4.8	8.5	3.3
16	Phosphate	mg/l	--	--	0.05	0.04	0.05	0.09	0.11	0.19	0.14	0.08
17	Fluorides as F	mg/l	1.5	1	0.33	0.34	0.47	0.45	0.49	0.39	0.51	0.44
18	Cyanide	mg/l	NR	0.05	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
19	Arsenic as As	mg/l	0.05	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
20	Boron as B	mg/l	1.0	0.5	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)
21	Cadmium as Cd	mg/l	NR	0.003	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)	BLQ(LO Q 0.001)
22	Chromium as Cr	mg/l	NR	0.05	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
23	Copper as Cu	mg/l	1.5	0.05	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
24	Iron as Fe	mg/l	NR	0.3	0.064	0.092	0.045	0.098	0.065	0.076	0.048	0.083
25	Lead as Pb	mg/l	NR	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
26	Manganese as Mn	mg/l	0.3	0.1	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)	BLQ(LO Q 0.05)
27	Mercury	mg/l	NR	0.001	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO	BLQ(LO



S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Near Project Site	Chinna Gaundana halli	Bedaraha lli	Guliyanu r	Periyannur	Panchapalli	Oddardinnai	Kottur
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
					Q 0.0005)	Q 0.0005)	Q 0.0005)	Q 0.0005)	Q 0.0005)	Q 0.0005)	Q 0.0005)	Q 0.0005)
28	Nickel as Ni	mg/l	NR	0.02	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)	BLQ(LO Q 0.01)
29	Selenium as Se	mg/l	NR	0.01	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)	BLQ(LO Q 0.005)
30	Zinc as Zn	mg/l	15	5	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)	BLQ(LO Q 0.1)

(Note: BLQ – Below the Limit of Quantification; LOQ – Limit of Quantification; NR – No Relaxation)

3.10.2 Results and Discussions

A summary of analytical results are presented below:

- The ground water results of the study area indicate that the pH range varies between 6.72 and 8.26. It is observed that the pH range is within the permissible limit of IS 10500:2012.
- The Total Dissolved Solids range of the collected ground water sample is varied between 489mg/l – 825 mg/l. All the samples are within the permissible limit of IS 10500: 2012.
- The acceptable limit of the chloride content is 250mg/l and permissible limit is 1000 mg/l. The chloride content in the collected ground water samples in the study area ranges between 84.2 mg/l – 126.4 mg/l. It is observed that all the samples are within the acceptable limit of IS 10500:2012.
- The acceptable limit of the sulphate content is 200mg/l and permissible limit is 400mg/l. the sulphate content in the collected ground water samples in the study area is varied between 27.6 mg/l – 69.9 mg/l. It is observed that all the samples are meeting the acceptable limit of the IS 10500: 2012.
- The Total hardness ranges is between 167 mg/l – 391 mg/l for ground water samples. It is observed that all the samples are within the permissible limit of the IS 10500: 2012.

3.11 Soil as a resource and its Quality

The district has a wide range of soil types. In general, the soil in the district is quite loose and fresh with its colour varying from red to dark brown. The soils are mostly in-situ in nature, lateritic, earthy and pale reddish in colour. The soil has low nitrogen and phosphate content with marked variations between different taluks. Different types of the soils such as black or mixed loams, red ferruginous and gravel are found in the district. The black or red loam is very fertile due to its moisture absorbing character, which is found in Dharmapuri taluk. Red and sandy soil are seen in Harur taluk. Lateritic and sandy coastal alluvium soils are found in almost all blocks. Considerable stretches of good loam and black soil are found in Dharmapuri district. Soil quality monitoring locations & results are given in **Table 3-19&Table 3-20**. Map showing the soil monitoring locations is given in **Figure 3-29**.



Table 3-16 Soil & Sediment Quality Monitoring Locations

Location Code	Location	Distance (km) from Project boundary	Azimuth Direction
S1	Near project site	Within the Site	
S1	Chinna Gaundanahalli	3.89	NE
S3	Bedarahalli	1.41	ESE
S4	Guliyannur	4.59	ESE
S5	Periyannur	4.25	S
S6	Panchapalli	2.52	SW
S7	Oddardinnai	1.11	SW
S8	Kottur	2.55	NNW

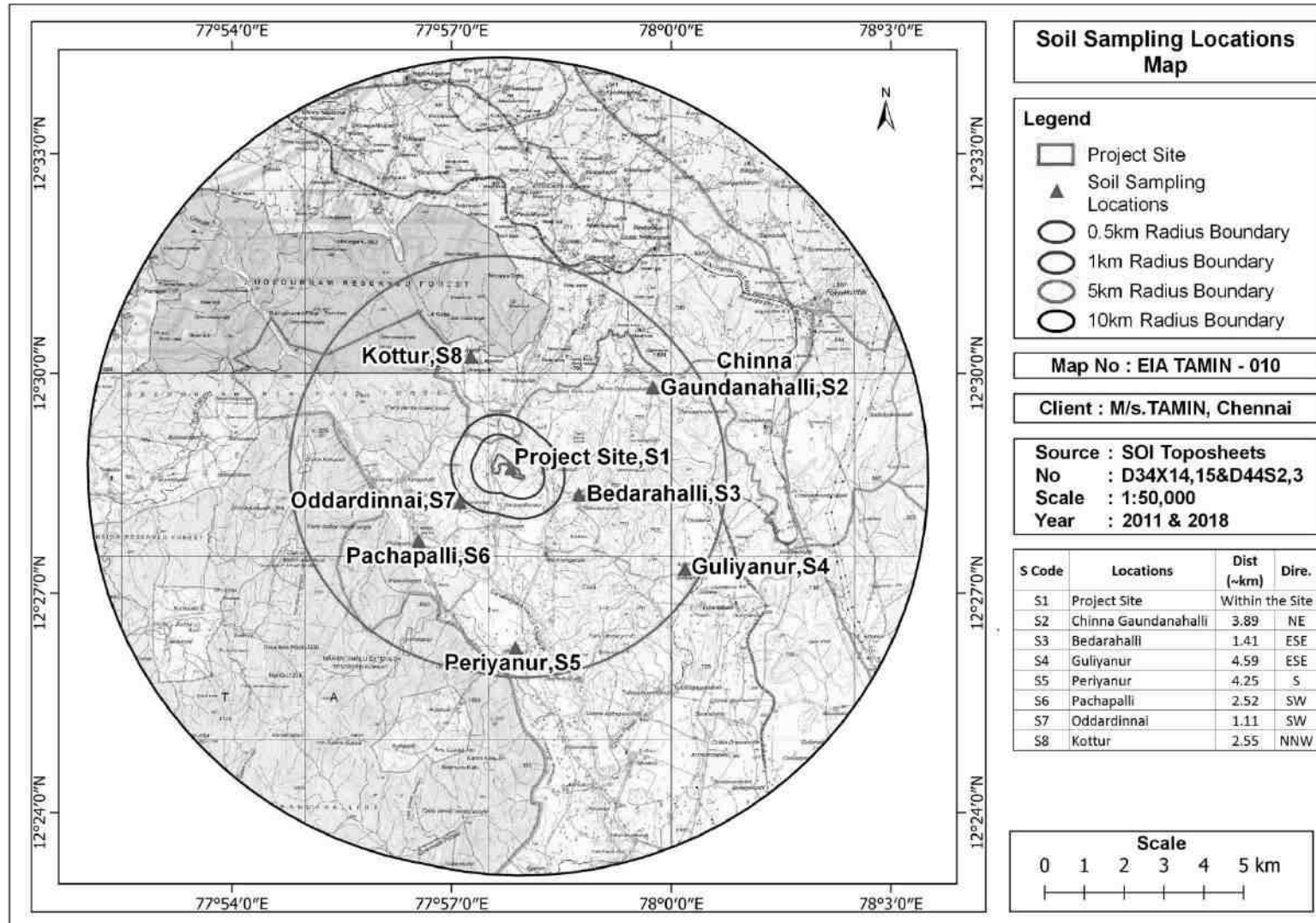


Figure 3-28 Map showing the soil monitoring location

Table 3-17 Soil & Sediment Quality Monitoring Results

S.No	Parameters	Units	Near Project Site	Chinna Gaundana halli	Bedarahalli	Guliyapur	Periyapur	Panchapalli	Oddardinnai	Kottur
			S1	S2	S3	S4	S5	S6	S7	S8
1.	Soil Texture	-	Sandy Loam	Sandy Loam	Sandy Clay	Sandy Clay Loam	Sandy Clay	Sandy Clay Loam	Sandy Clay	Sandy Clay Loam
2.	Sand	%	65.2	58.8	53.7	52.1	50.7	48.5	52.3	55.6
3.	Silt	%	19.6	25.7	10.8	24.5	8.1	17.7	12.2	19.7
4.	Clay	%	15.2	15.5	35.5	23.4	41.2	33.8	35.5	24.7
5.	pH	-	7.3	7.1	7.96	6.54	7.4	7.88	7.2	7.7
6.	Electrical conductivity	µS/cm	196	153	101	127	134	155	169	197
7.	Cation Exchange Capacity	meq/100g	7.7	8.1	6.8	11.2	7.9	10.3	6.8	7.9
8.	Organic Carbon	%	0.31	0.44	0.33	0.85	0.51	0.71	0.83	0.49
9.	Organic matter	%	0.83	0.67	0.54	0.97	1.14	1.23	0.89	0.92
10.	Nitrogen as N	mg/kg	183.6	146.7	156.9	211.9	257.8	231.6	177.9	159.2
11.	Phosphorus	mg/kg	95.4	72.8	79.13	100.5	130.6	117.9	89.3	81.95
12.	Potassium	mg/kg	53.4	37.9	40.61	52.7	66.9	71.9	49.6	42.7
13.	Boron as B	mg/kg	0.31	0.33	0.29	0.47	0.61	0.49	0.63	0.49
14.	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
15.	Chromium as Cr	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
16.	Copper as Cu	mg/kg	0.29	0.34	0.59	0.45	0.66	0.52	0.49	0.67
17.	Iron as Fe	mg/kg	5.01	6.29	5.87	3.96	5.56	6.13	5.32	4.99
18.	Manganese as Mn	mg/kg	3.11	4.56	2.96	3.15	4.26	3.81	3.67	2.34
19.	Zinc as Zn	mg/kg	0.64	0.92	0.55	0.29	0.57	0.77	0.63	0.91

Note: BLQ: Below the Limit of Quantification; LOQ: Limit of Quantifications

3.11.1 Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 6.54 to 7.96 Indicating that the soils are slightly acidic to moderately alkaline in nature.
- Conductivity of the soil samples ranged from 101 to 197 μ mhos/cm.
- Nitrogen content in the collected soil samples ranged from 146.7 mg/kg to 257.8 mg/kg.
- Phosphorous content ranged from 72.8 mg/kg to 130.6 mg/kg.
- Potassium content ranges from 37.9 mg/kg to 71.9 mg/kg.

3.12 BIOLOGICAL ENVIRONMENT

An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if any. The biological study was under taken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining its health. Secondary information was collected to study the flora & fauna in 10 km radius. Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. All the available information was recorded about the wild plants and cultivated crop plants.

During secondary information, following aspects were considered for ecological studies:

- ❖ Assessment of present status of flora and fauna;
- ❖ Identification of rare and endangered species of plants and animals (if any);
- ❖ Identification of ecologically sensitive areas within the study area;
- ❖ Assessment of migratory route of wildlife (if any); and
- ❖ Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources.

3.12.1 Methodology

Terrestrial investigations for flora and fauna records were collected by secondary information like research article, periodicals, floras and forest checklist.

3.12.2 Floral Study

- ❖ Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral, other related literature.
- ❖ Besides the identification of plant species, information was collected on the vernacular names and uses of plants made by local inhabitants.

3.12.3 Faunal Study

- ❖ Secondary information collected from published government data etc.
- ❖ List of the endangered and endemic species as per the schedule of The Wildlife Protection Act, 1972.
- ❖ Emphasis is given to identify avifauna and mammals to determine the presence and absence of Schedule-1 species, listed in The Wildlife Protection Act 1972, as well as in Red List of IUCN.

3.12.4 Floristic composition within the study area

For secondary information based on a total 112 species under 41 family found in the study area. The detailed list of plant species found in each quadrat provided in **Table 1**.

Table3.1: Checklist of floral diversity in and around the area

Sl.No.	Species	Family	Common Name	Habit	IUCN
1	<i>Abrusprecatorius</i>	Fabaceae	Kundumani	Shrub	NA
2	<i>Abutilon indicum</i>	Malvaceae	Perunthuthi	Shrub	NA
3	<i>Acacia nilotica</i>	Mimosaceae	Karuvelam	Tree	LC
4	<i>Acacia planifrons</i>	Mimosaceae	Kodaivelam	Tree	NA
5	<i>Acalypha indica</i>	Euphorbiaceae	Kuppaimeni	Herb	NA
6	<i>Acanthospermumhispidum</i>	Compositae	--	Herb	NA
7	<i>Achyranthes aspera</i>	Amaranthaceae	Nayurivi	Herb	NA
8	<i>Aeglemarmelos</i>	Rutaceae	Vilvam	Tree	NA
9	<i>Aervalanata</i>	Amaranthaceae	Peelai, Sirupeelai	Shrub	NA
10	<i>Aervapersica</i>	Amaranthaceae	Perumpeelai	Shrub	NA
11	<i>Aeschynomeneamericana</i>	Fabaceae	--	Herb	NA
12	<i>Aeschynomeneaspera</i>	Fabaceae	Thakkai	Shrub	NA
13	<i>Ageratum conyzoides</i>	Compositae	Poompillu	Herb	NA
14	<i>Alloteropsiscimicina</i>	Poaceae	--	Grass	NA
15	<i>Alternantherasessilis</i>	Amaranthaceae	Ponnanganni	Herb	NA
16	<i>Anisomelesindica</i>	Labiatae	--	Herb	NA
17	<i>Annona squamosa</i>	Annonaceae	Seetha	Tree	NA
18	<i>Arachishypogaea</i>	Fabaceae	Verkadalai	Herb	NA
19	<i>Argemonemexicana</i>	Papaveraceae	BramanThandu	Herb	NA
20	<i>Aristidaadscensionis</i>	Poaceae	--	Grass	NA

21	<i>Aristidahystrix</i>	Poaceae	--	Grass	NA
22	<i>Aristolochiabracteolata</i>	Aristolochiaceae	Aduthinnappalai	Herb	NA
23	<i>Barleriaacuminata</i>	Acanthaceae	--	Shrub	NA
24	<i>Barlerialongiflora</i>	Acanthaceae	--	Shrub	NA
25	<i>Barlerianoctiflora</i>	Acanthaceae	--	Shrub	NA
26	<i>Boerhaviadiffusa</i>	Nyctaginaceae	Mookarattai	Herb	NA
27	<i>Boerhaviaerecta</i>	Nyctaginaceae	Seemaimookarattai	Herb	NA
28	<i>Carica papaya</i>	Caricaceae	Pappali	Tree	NA
29	<i>Carissa carandas</i>	Apocynaceae	Kalaa, Perunkala	Shrub	NA
30	<i>Cassia fistula</i>	Caesalpiniaceae	Kondrai	Tree	NA
31	<i>Celosia argentea</i>	Amaranthaceae	Pannaikereai	Herb	NA
32	<i>Cissus quadrangularis</i>	Vitaceae	Pirandai	Shrub	NA
33	<i>Citrulluscolocynthis</i>	Cucurbitaceae	Peikkumatti	Herb	NA
34	<i>Citrus aurantifolia</i>	Rutaceae	Elumichai	Tree	NA
35	<i>Cleome viscosa</i>	Capparidaceae	Naikadugu	Herb	NA
36	<i>Cocciniagrandis</i>	Cucurbitaceae	Kovai	Climber	NA
37	<i>Croton bonplandianum</i>	Euphorbiaceae	Rail poondu	Herb	NA
38	<i>Cucumis sativus</i>	Cucurbitaceae	Vellarikkaai	Climber	NA
39	<i>Cyperusbulbosus</i>	Cyperaceae	—	Sedge	NA
40	<i>Ecliptaprostrata</i>	Compositae	Karisaalai	Herb	NA
41	<i>Eleocharisacutangula</i>	Cyperaceae		Sedge	NA
42	<i>Eragrostistenella</i>	Poaceae		Grass	NA
43	<i>Euphorbia antiquorum</i>	Euphorbiaceae	Sadura-kalli	Tree	NA
44	<i>Euphorbia hirta</i>	Euphorbiaceae	Ammanpacharisi	Herb	NA
45	<i>Euphorbia indica</i>	Euphorbiaceae	Ammanpacharisi	Herb	NA
46	<i>Evolvulusalsinoides</i>	Convolvulaceae	Vishnukarandi	Herb	NA
47	<i>Ficusbenghalensis</i>	Moraceae	Aalamaram	Tree	NA
48	<i>Ficus religiosa</i>	Moraceae	Arasu	Tree	NA
49	<i>Fimbristylisovata</i>	Cyperaceae		Sedge	NA
50	<i>Glinuslotoides</i>	Molluginaceae	Siruseruppadai	Herb	NA
51	<i>Gynandropsisgynandra</i>	Capparidaceae	Nalvaelai, Vaelai	Herb	NA
52	<i>Hedyotisaspera</i>	Rubiaceae		Herb	NA
53	<i>Heliotropiumindicum</i>	Boraginaceae	Thaelkodukku	Herb	NA
54	<i>Hibiscus surattensis</i>	Malvaceae		Undershrub	NA
55	<i>Hybanthusenneaspermus</i>	Violaceae	Orilathamara	Herb	NA
56	<i>Hygrophilashulli</i>	Acanthaceae	Neermulli	Herb	NA
57	<i>Hyptissuaveolens</i>	Labiatae		Shrub	NA
58	<i>Indigoferaaspalathoides</i>	Fabaceae	Sivanaarvaambu	Herb	NA
59	<i>Indigoferalinnaei</i>	Fabaceae		Herb	NA
60	<i>Indigofera tinctoria</i>	Fabaceae	Avuri, Neeli	Herb	NA
61	<i>Ipomoea pes-caprae</i>	Convolvulaceae	Attukkal, KudhiraiKulambu	Creeper	NA
62	<i>Jasminumsambac</i>	Oleaceae	Malli, Peru malli, Pichigai	Climbing Shrub	NA
63	<i>Jatropha curcas</i>	Euphorbiaceae	Kaatu-amanakku	Shrub	NA

64	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
65	<i>Justicia adhatoda</i>	Acanthaceae	Adathodai	Shrub	NA
66	<i>Justicia simplex</i>	Acanthaceae		Herb	NA
67	<i>Kylinga bulbosa</i>	Cyperaceae		Sedge	NA
68	<i>Lagenaria siceraria</i>	Cucurbitaceae	Surakkaai	Climber	NA
69	<i>Lantana camara</i>	Verbenaceae	Unnichi	Shrub	NA
70	<i>Leucaena leucocephala</i>	Mimosaceae	Soundil	Tree	NA
71	<i>Leucas aspera</i>	Labiatae	Thumbai	Herb	NA
72	<i>Ludwigia perennis</i>	Onagraceae		Herb	NA
73	<i>Martynia annua</i>	Martyniaceae	Thael Kodukku	Herb	NA
74	<i>Melia azedarach</i>	Meliaceae	Malai vaambu	Tree	NA
75	<i>Merremia hederacea</i>	Convolvulaceae		Herb	NA
76	<i>Nyctanthes arbor-tristis</i>	Nyctanthaceae	Parijaatham	Tree	NA
77	<i>Ocimum americanum</i>	Labiatae	Ganjaankorai	Herb	NA
78	<i>Pavonia odorata</i>	Malvaceae	Peramutti	Herb	NA
79	<i>Pedaliium murex</i>	Pedaliaceae	Perunerunji	Herb	NA
80	<i>Phyllanthus acidus</i>	Euphorbiaceae	Aranelli	Tree	NA
81	<i>Phyllanthus amarus</i>	Euphorbiaceae	Kizha-nelli	Herb	NA
82	<i>Phyllanthus emblica</i>	Euphorbiaceae	Nelli, Muzhunelli	Tree	NA
83	<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Inkipazham	Shrub	NA
84	<i>Pithecellobium dulce</i>	Mimosaceae	Kodukkaaipuli	Tree	NA
85	<i>Plumbago zeylanica</i>	Plumbaginaceae	Chitthiragam	Herb	NA
86	<i>Polygala javana</i>	Polygalaceae		Shrub	NA
87	<i>Pongamia pinnata</i>	Fabaceae	Pungamaram	Tree	NA
88	<i>Portulaca oleracea</i>	Portulacaceae	Kari keerai	Herb	NA
89	<i>Prosopis juliflora</i>	Mimosaceae	Velikkaathan	Tree	NA
90	<i>Psidium guajava</i>	Myrtaceae	Koyya	Tree	NA
91	<i>Punica granatum</i>	Punicaceae	Madhulai	Shrub	NA
92	<i>Rhynchosia viscosa</i>	Fabaceae		Climber	NA
93	<i>Ricinus communis</i>	Euphorbiaceae	Amanakku	Shrub	NA
94	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Boodhikeerai	Climber	NA
95	<i>Ruellia tuberosa</i>	Acanthaceae		Herb	NA
96	<i>Sansevieria roxburghiana</i>	Dracaenaceae	Marun, Mottamamji	Herb	NA
97	<i>Senna auriculata</i>	Caesalpiniaceae	Avaram	Shrub	NA
98	<i>Senna occidentalis</i>	Caesalpiniaceae	Peiyavarai	Tree	NA
99	<i>Sesamum indicum</i>	Pedaliaceae	Ellu	Herb	NA
100	<i>Sida acuta</i>	Malvaceae	Malaitthangi	Herb	NA
101	<i>Sida cordata</i>	Malvaceae	Pazhampaasi	Herb	NA
102	<i>Sida cordifolia</i>	Malvaceae	Nilatutthi	Herb	NA
103	<i>Solanum americanum</i>	Solanaceae	Manatakkali	Herb	NA
104	<i>Solanum melongena</i>	Solanaceae	Kathiri	Herb	NA
105	<i>Solanum torvum</i>	Solanaceae	Chundai	Shrub	NA
106	<i>Solanum trilobatum</i>	Solanaceae	Thoodhuvalai	Climber	NA
107	<i>Solanum virginianum</i>	Solanaceae	Kandankathiri	Herb	NA

108	Spermacocehispidia	Rubiaceae	Nathaichoori	Herb	NA
109	Spermacoceocymoides	Rubiaceae		Herb	NA
110	Tamarindus indica	Caesalpiniaceae	Puliyamaram	Tree	NA
111	Tectona grandis	Verbenaceae	Thekku	Tree	NA
112	Tephrosia purpurea	Fabaceae	Kozhinji	Undershrub	NA

Source:

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3.12.5 Terrestrial Fauna of the Study Area

The core area is not a habitat for any Rare or endangered or threatened (RET) wildlife. Common rodents, reptiles and birds were seen. There was nothing unusual or special about the wild fauna of the core area. Within 5 Km from the core area, Elephant and Bison corridor is there. Among the large birds, Peacocks were found both in the forest and non-forest areas. A list of vertebrates other than Aves that were either spotted or reported from the study area is given in Table – 00. A list of terrestrial birds that were spotted and those that were recorded from the study area is given in **Table 00**.

LIST OF TERRESTRIAL VERTEBRATES OTHER THAN BIRDS REPORTED

Scientific name	Common name	Family	IUCN/WPA
MAMMALS			
Bandicotabengalensis	Lesser Bandicoot Rat	Hystriidae	LC/IV
Bandicotaindica	Greater Bandicoot Rat	Hystriidae	LC/IV
Cynopterus sphinx	Greater Short-nosed Fruit Bat	Pteropodidae	LC/IV

Felischaus	JungleCat	Felidae	LC/III
Funambuluspalmarum	Three-stripedPalm Squirrel	Sciuridae	LC/IV
Macacumulatta	RhesusMacaque	Cercopithecidae	LC/II
Musbooduga	LittleIndianFieldMouse	Hystricidae	LC/IV
Rattusrattus	HouseRat	Hystricidae	LC/IV
Semnopithecusentellus	CommonLangur	Cercopithecidae	LC/II
REPTILES			
Calotesrouxii	Roux'sForestCalotes	Agamidae	LC/IV
Calotesversicolor	IndianGardenLizard	Agamidae	LC/IV
Eutropiscarinata	Keeled/CommonGrassSkink	Scincidae	LC/IV
Eutropismaularia	BorneGrassSkink	Scincidae	LC/IV
Hemidactylusbrooki	Brooke'sHouseGecko	Geckonidae	LC/IV
Hemidactylusflaviviridis	HouseGecko	Geckonidae	LC/IV
Hemidactylusfrenatus	AsianHouseGecko	Geckonidae	LC/IV
Hemidactylusleschnaulti	BarkGecko	Geckonidae	LC/IV
Najanaja	SpectacledCobra	Colubridae	VU/II
Ophiophagushannah	KingCobra	Elapidae	VU/II
Ptyasmucosa	IndianRatSnake	Colubridae	LC/II
Xenochrophispiscator	CheckeredKeelbackWaterSnake	Colubridae	LC/II
AMPHIBIANS			
Bufoscaber	Ferguson'sToad	Bufo	LC/ IV
Clinotarsuscurtipes	Bi-coloredFrog	Dicoglossidae	LC/ IV
Duttaphrynusmelanostictus	CommonIndianToad	Bufo	LC/ IV
Euphlyctiscyanophlyctis	SkitteringFrog	Dicoglossidae	LC/ IV
Euphlyctishexadactylus	IndiangreenFrog	Dicoglossidae	LC/ IV
Hoplobatrachuscrassus	Jerdon'sBullFrog	Dicoglossidae	LC/ IV
Hoplobatrachustigerinu	IndianbullFrog	Dicoglossidae	LC/ IV
Indiranabrachytarsus	Short-leggedLeapingfrog	Ranixalidae	LC/ IV
Limnecteslimnocharis	Paddyfield/CricketFrog	Dicoglossidae	LC/ IV
Microhylaornata	OrnateNarrow-mouthedFrog	Microhylidae	LC/ IV
Sphaerothecabreviceps	IndianBurrowingFrog	Dicoglossidae	LC/ IV
Sphaerothecarolanda	SouthernBurrowingFrog	Dicoglossidae	LC/ IV

LIST OF TERRESTRIAL BIRDS EITHER REPORTED THE STUDY AREA

Scientific name	Common name	Family	IUCN/WPA
Acridotheres fuscus	Jungle Myna	Sturnidae	LC/ IV
Acridotheres tristis	Common Myna	Sturnidae	LC/ IV
Acritillas indica	Yellowbrowed Bulbul	Pycnonotidae	LC/ IV
Anthus trivialis	Tree Pipit	Motacillidae	LC/ IV
Apus affinis	Little Swift	Apodidae	LC/ IV
Athene brama	Spotted Owlet	Strigidae	LC/ IV
Butastur teesa	White-eyed Buzzard	Accipitridae	LC/ IV
Cacomantis passerinus	Greybellied Cuckoo	Cuculidae	LC/ IV
Chloropsis jerdoni	Jerdon's Leafbird	Chloropseida	LC/ IV
Chrysocolaptes lucidus	Greater Flameback	Picidae	LC/ IV
Chrysommasinense	Yelloweyed Babbler	Timaliidae	LC/ IV
Cinnyris asiaticus	Purple Sunbird	Nectariniidae	LC/ IV
Coracias benghalensis	Indian Roller	Coraciidae	LC/ IV
Coracinamacei	Large Cuckoo Shrike	Campephagidae	LC/ IV
Coracinamelanoptera	Blackheaded Cuckoo Shrike	Campephagidae	LC/ IV
Corvus culminatus	Indian Jungle Crow	Corvidae	LC/ IV
Corvus splendens	House Crow	Corvidae	LC/ V
Cuculus micropterus	Indian Cuckoo	Cuculidae	LC/ IV
Cyornis tickelliae	Tickell's Blue Flycatcher	Muscicapidae	LC/ IV
Cypsiurus balasiensis	Asian Palm Swift	Apodidae	LC/ IV
Dendrocitta vagabunda	Rufous Treepie	Corvidae	LC/ IV
Dendrocopos mahrattensis	Yellowcrowned Woodpecker	Picidae	LC/ IV
Dendrocopos nanus	Browncapped Pygmy Woodpecker	Picidae	LC/ IV
Dicrurus macrocercus	Black Drongo	Cuculidae	LC/ IV
Elanus caeruleus	Blackwinged Kite	Accipitridae	LC/ IV
Eudynamis scolopacea	Asian Koel	Cuculidae	LC/ IV
Glaucidium radiatum	Jungle Owlet	Strigidae	LC/ IV
Haliastur indus	Brahminy Kite	Accipitridae	LC/ IV
Harpactes fasciatus	Malabar Trogon	Trogonidae	LC/ IV
Iduna aedon	Thickbilled Warbler	Sylviidae	LC/ IV
Irenapueella	Asian Fairybluebird	Irenidae	LC/ IV
Lanius cristatus	Brown Shrike	Laniidae	LC/ IV
Lonchura malacca	Tricoloured Munia	Estrildidae	LC/ IV
Lonchura punctulata	Scalybreasted Munia	Estrildidae	LC/ IV
Lonchura striata	Whiterumped Munia	Estrildidae	LC/ IV
Loriculus vernalis	Vernal Hanging Parrot	Psittacidae	LC/ IV
Luscinia svecica	Bluethroat	Muscicapidae	LC/ IV
Megalaima haemacephala	Coppersmith Barbet	Megalaimidae	LC/ IV
Megalaima malabarica	Malabar Barbet	Megalaimidae	LC/ IV
Megalaima viridis	Whitecheeked Barbet	Megalaimidae	LC/ IV
Megalaima zeylanica	Brownheaded Barbet	Megalaimidae	LC/ IV
Merops orientalis	Green Bee-eater	Meropidae	LC/ IV
Merops philippinus	Bluetailed Bee-eater	Meropidae	LC/ IV
Milvus migrans	Black Kite	Accipitridae	LC/ IV
Motacilla cinerea	Grey Wagtail	Muscicapidae	LC/ IV
Muscicapadaurica	Asian Brown Flycatcher	Muscicapidae	LC/ IV
Myophonus horsfieldii	Malabar Whistling Thrush	Turdidae	LC/ IV
Nisaetus cirrhatous	Crested Hawk Eagle	Accipitridae	LC/ IV
Nyctornis athertoni	Bluebearded Bee-eater	Meropidae	LC/ IV
Orthotomus sutorius	Common Tailorbird	Sylviidae	LC/ IV
Parus aplonotus	Indian Yellow Tit	Paridae	LC/ IV

Passerdomesticus	HouseSparrow	Passeridae	LC/ IV
Pavocristatus	IndianPeafowl	Phasianidae	LC/ I
Pellorneumruficeps	PuffthroatedBabbler	Timaliidae	LC/ IV
Phylloscopustrochiloides	GreenishWarbler	Sylviidae	LC/ IV
Picumnusinnominatus	SpeckledPiculet	Picidae	LC/ IV
Pittabrachyura	IndianPitta	Pittidae	LC/ IV
Ploceusmanyar	StreakedWeaver	Ploceidae	LC/ IV
Ploceusphilippinus	BayaWeaver	Ploceidae	LC/ IV
Pomatorhinushorsfieldii	IndianScimitarBabbler	Timaliidae	LC/ IV
Priniahodgsonii	GreybreastedPrinia	Cisticolidae	LC/ IV
Priniainornata	PlainPrinia	Cisticolidae	LC/ IV
Priniasocialis	AshyPrinia	Cisticolidae	LC/ IV
Psittaculacolumboides	BluewingedParakeet	Psittacidae	LC/ IV
Psittaculacyanocephala	PlumheadedParakeet	Psittacidae	LC/ IV
Psittaculakrameri	RoseringedParakeet	Psittacidae	LC/ IV
Ptyonoprogneconcolor	DuskyCragMartin	Hirundinidae	LC/ IV
Pycnonotuscafer	RedventedBulbul	Pycnonotidae	LC/ IV
Pycnonotusgularis	Flame-throatedBulbul	Pycnonotidae	LC/IV
Pycnonotusjocosus	RedwhiskeredBulbul	Pycnonotidae	LC/ IV
Pycnonotusluteolus	WhitebrowedBulbul	Pycnonotidae	LC/ IV
Rhipiduraalbobularis	WhitespottedFantail	Rhipiduridae	LC/ IV
Rhopocichlaatriceps	DarkfrontedBabbler	Timaliidae	LC/ IV
Saxicolacaprata	PiedBushchat	Muscicapidae	LC/ IV
Saxicoloidesfulicatus	IndianRobin	Muscicapidae	LC/ IV
Sittafrontalis	VelvetfrontedNuthatch	Sittidae	LC/ IV
Spilopeliachinensis	SpottedDove	Columbidae	LC/ IV
Streptopeliadecaocto	EurasianCollaredDove	Columbidae	LC/ IV
Streptopeliaorientalis	OrientalTurtleDove	Columbidae	LC/ IV
Tephrodornisgularis	LargeWoodshrike	Tephrodornithidae	LC/ IV
Tephrodornispondicerianus	CommonWoodshrike	Tephrodornithidae	LC/ IV
Tephrodornissylvicola	MalabarWoodshrike	Tephrodornithidae	LC/ IV
Terpsiphonoparadisi	AsianParadiseFlycatcher	Monarchidae	LC/ IV
Treronbicinctus	OrangebreastedGreenpigeon	Columbidae	LC/ IV
Turdoidesstriata	JungleBabbler	Timaliidae	LC/ IV
Turdussimillimus	IndianBlackbird	Turdidae	LC/ IV
Turnixsuscitator	BarredButtonquail	Turnicidae	LC/ IV
Turnixtanki	YellowleggedButtonquail	Turnicidae	LC/ IV
Upupaepops	Hoopoe	Upupidae	LC/ IV
Zootheracitrina	OrangeheadedThrush	Turdidae	LC/ IV

3.12.6 Butterfly Species

Butterfly can also serve as useful indicators of habitat biodiversity. They are responsible for a large part of the complex interconnections that characterize natural ecosystems. The butterfly communities that are present in forests help to maintain crucial ecological processes and preserve biodiversity as a whole. They participate in most of the ecological processes that sustain ecosystems. A totally 26 species belonging to five families of butterflies recorded. The Nymphalidae were more dominant family followed by Lycaenidae, Pieridae, Papilionidae and Hesperidae.

Table 5: Occurrence of butterfly species in buffer zone

S.No	Family	Species name	Common name	Status
1	Nymphalidae	Danauschrysis	Plain Tiger	NA
2	Nymphalidae	Danausgenutia	Striped Tiger	NA
3	Nymphalidae	Ariadne merione	Common Caster	NA
4	Nymphalidae	Neptishylas	Common Sailor	NA
5	Nymphalidae	Phalantaphalantha	Common Leopard	NA
6	Nymphalidae	Melanitisleda	Common Evening Brown	NA
7	Nymphalidae	Mycalesisperseus	Common Bush Brown	NA
8	Nymphalidae	Ypthimaasterope	Common Three Ring	NA
9	Nymphalidae	Euthalanais	Baronet	NA
10	Nymphalidae	Argynnis hyperbius	Indian Fritillary	NA
11	Nymphalidae	Bybliailithya	Joker	NA
12	Pieridae	Colotisdanae	Crimson Tip	NA
13	Pieridae	Colotisetrida	Small Orange Tip	NA
14	Pieridae	Euremahegabe	Common Grass Yellow	NA
15	Pieridae	Catopsillapomona	Common Emigrant	NA
16	Pieridae	Ceporanerissa	Common Gull	NA
17	Pieridae	Leptosianina	Psyche	NA
18	Lycaenidae	Castaliusrosimon	Common Pierrot	NA
19	Lycaenidae	Arhopalacentaurus	Large Obakblue	NA
20	Lycaenidae	Euchrysopscejus	Gram Blue	NA
21	Lycaenidae	Jamidesceleno	Common Cerulin	NA
22	Lycaenidae	Freyeriatrochylus	Grass Jewel	NA
23	Papilionidae	Papiliopolytes	Common Mormon	NA
24	Papilionidae	Papiliodemoleus	Lime Butterflies	NA
25	Papilionidae	Atrophaneura aristolochiae	Common Rose	NA
26	Hesperiidae	Borbocinnara	Rice Swift	NA

LC- Least Concern, NT- Near Threatened, EN- Endangered, NE-Not Evaluated, DD -Data Deficient, VU- Vulnerable, IUCN- International Union for Conservation of Nature.

Source:

1. List of Birds: Ali, S. (2002). The Book of Indian Birds (13th Revised Edition). Oxford University Press, New Delhi, 326pp.
2. List of Butterflies: Kehimkar I. The Book of Indian Butterflies. Bombay Natural History Society, 2008, 497.
3. List of Mammals: Kamalakannan, M&P.O.Nameer (2019). A checklist of mammals of Tamil Nadu, India. Journal of Threatened Taxa 11(8): 13992–14009; <https://doi.org/10.11609/jott.4705.11.8.13992–14009>.
4. List of Reptiles: Aengals, R., Sathish Kumar, V.M., Palot, M.J. & Ganesh, S.R. (2018). A Checklist of Reptiles of India. 35 pp. Version 3.0. Online publication is available at www.zsi.gov.in (Last update: May 2018)

5. List of schedule species : <http://wiienviis.nic.in/Database/ Schedule species database>.

3.12.7 Conservation Plan for Indian Peafowl (Peacock)

An Indian Peafowl or Peacock (*Pavocristatus*) is a large pheasant justifiably declared as the National Bird of India in 1963 due to its flagship value founded on its glorious position in mythology and its widespread distribution and grandeur. In India, it is given the utmost protection by inclusion in Schedule 1 of Indian Wildlife Act, 1972 (2002). Being a wide spread species, apart from the various urban habitats, it is also found in agriculture field, along stream with good vegetation and close to human habitation in semi – feral conditions. In the present study area this species have been confirmed from various habitats located near the village periphery.

3.12.7.1 Appearance

Male peacock has a spectacular glossy green long tail feathers that may be more than 60% of the total body length. These feathers have blue, golden green and copper colored eyes. The long tail feathers are used for mating rituals like courtship displays. The feathers are arched into a magnificent fan shaped from across the back of the bird and almost touching the ground on both sides. Female do not have these graceful tail feathers. They have to fan like crest with white face and throat, chestnut brown crown and hind neck, metallic green upper breast and mantle, white belly and brown back rump and tail. Their primaries are dark brown.

3.12.7.2 Study Approach

Since the buffer zone of the proposed Project site unit reported with Schedule 1 Species named as *Pavocristatus* commonly known as peacock, a systematic study was conducted to assess their status in terms of movement and habitat use of the species. At first, a detailed biological survey of the core & buffer zone was carried out to understand the status distribution of the species in the study area. Also, questionnaire survey was carried out to understand the recent status of peacock sighting and their movements. The conclusion of the survey discussed the potential sighting & habitat use, and movement and food habitats of peacock in the study area.

3.12.7.3 Sighting and Habitat Use

From the core zone no any peacock was sighted. However, direct sighting of the peacock were located near the human dominated and associated surround habitats like agriculture fields and near water bodies. This species is well adapted to natural village environment setting. According to the villagers (interview), during day time that temporally move towards the surrounding areas like agricultural fields or water bodies for feeding while during night time roosts on the trees present in vicinity of the human settlement and also road side trees. Some villages emphasized that, sometime peacock roosts on the roof of the houses.

3.12.7.4 Food and Feeding Habitats

Peafowls are omnivores, eating plant parts, flower petals, seed heads, insects, and other arthropods, reptiles and amphibians. In the study area dense tree canopy cover supports good insect diversity which is very common food for peafowls.

3.12.7.5 Habitat Improvement Action Plan

Habitat improvement program will include plantation of various plant species like *Borassusflabiliber*, *MangiferaIndica*, *Tamarindusindica* and other grass species reported from the study area should be taken into priority. In order to improve vegetation cover, it is suggested to carry out extensive afforestation program in different phases. These species will help to provide habitat for faunal diversity, and also increases the species diversity and maintain the naturalness of the surrounding area.

3.12.7.6 Seed Distribution among the Villagers

During this habitat improvement programme the seed of *Borassusflabiliber*, *Mangiferaindica*, *Tamarindusindica* and other grass seeds will be distributed in the various villages of the study area. Compost packets will be also provided at the intervals of the every one year by the proponent (in consultation of forest department).

3.12.7.7 Water Filing in the existing Water Bodies during Summer

Water will be filled in the existing water bodies by water tankers (five numbers in each water body).

3.12.7.8 Inference – Buffer Zone as Peacock Habitat

Presented survey of the peacock in the buffer zone of the project site shows that, peafowl is well adapted to the existing rural setting of the study area. However, the following points can give an insight on the overall status of peafowl in the study area and thereby plan for better management strategies related to proposed activities.

- ❖ Local resident of the study area well aware of the movement pattern of peafowl in their surrounding habitats.
- ❖ Peafowl uses agriculture and various rural habitats as a feeding ground during day time while during night time they take shelter on the trees as well as on the roof of the houses. It clearly indicates peafowl normally uses ecosystem or habitats adjacent to village.

From the above said facts, it can be inferred that, some villages of the buffer zone provide roosting and feeding ground for peafowl, while core zone do not have potential habitat for roosting or feeding ground for peafowl. Therefore, it has been visualized that, the proposed project will not have any significant impact on peacock in terms of their normal movements and other activities. However, it is necessity to take some management option like habitat improvement in the villages located in the immediate vicinity of the project site. So, habitat improvement programme (Plantation of recommended and local plant species) will be under taken in (in consultation of forest department) different villages located in the close vicinity of the project

area. Under this programme sampling will be distributed in the nearby villages with the consultation of the local forest department.

In consultation of the forest department, following conservation measures will be adapted for peacock conservation:

- Habitat improvement programme in the different villages will be undertaken in the buffer zone area for shelter and roosting of peacocks. This will be achieved by plantation of local varieties of the tree species near villages in buffer area. Plantation will also be carried in some forest patches identified by local forest department.
- School level awareness programme will be conducted for conservation of peacock by organizing competition during “Wildlife Week” and “Van Mahotsav” celebration.

3.12.7.9 Conservation Measures

- Community inhabiting in study area should make well aware about the importance of the insects in their daily life especially butterflies and bees which acts a very vital role in pollination which results in high and successful fruiting of crops. This can be achieved by arrangements of village wise awareness campaigns.
- Community awareness for selection of wild ornamental plants in empty spaces, home gardens, and open scrub areas which provide breeding and feeding ground for Common Pierrot and such other butterflies and insects.
- Plant saplings of flowering and fruiting plants can be distributed to local people to promote the plantation of butterfly and bee friendly species which gives breeding and feeding platform to the species.

Table 1: Conservation plan for Peacock and Butterflies for five years

Sr. No	Work or Activity	1 to 5 years	Location
1	Plantation	350 trees per year plant of local plant species for five years in villages.	Villages covered in 10 km study area
2	Water filling	5 number in water hole filling during summer.	Ponds covered in 10 km study area
3	Awareness	In school of nearby villages for peacock conservation as Drawing Competition. (Peacock Picture) & Essay Writing on Peacock.	Villages covered in 5 km study area

****All above activity will be carried out with the consultation of Ecologist**

Plant Species will be suggested by the Ecologist and plant saplings will be distributed in project villages as per the above mentioned schedule (year wise).

The proponent has proposed a sum of Rs. 5,35,000/-for the “Schedule – I species” conservation plan under the following heads:

S.No	Work or Activity	Approximate Cost. Rs.				
		Year 1	Year 2	Year 3	Year 4	Year 5
1	Plantation-350 tree plants (@ 150/-per plant)	52,500/-	52,500/-	52,500/-	52,500/-	52,500/-
2	Small water tank –20 in number @ 5000/- per tank	1,00,000/-				
3	One awareness programme	20,000/-	20,000/-	20,000/-	20,000/-	20,000/-
	Total	202500/-	72,500/-	72,500/-	72,500/-	72,500/-

(Not including water supply, grass seed collection and plantation)

Following Plants will be planted on the periphery of Project area& along the Approachable Road

S.No	Botanical name	Common Name	Key future of Tree
1	Albizialebeck	Vagai	A middle-sized deciduous tree with a spreading crown.
2	AzadicrtaIndica	Vembu	It is adapted to various climate zones.
3	Dalbergia latifolia	Eeitti	It is common on deep loams or clays containing lime.
4	Ficusbenghalensis	Allamaram	Nesting and food purpose for wildlife
5	Ficusrelegiosa	Arasamaram	It is tolerant to various climate zones.
6	Madhucalongifolia	Illupai	A large deciduous shapely, long lived tree
7	Pongamiapinnata	Pungaimaram	Dust reduce
8	Pterocarpus marsupium	Vengai	--
9	Syzygiumcumini	Naval	It is tolerant to temprature resistant.
10	Termaniliaarjuna	Maruthu	It is reducing soil erosion

3.13 Socio Economic profile

Thiruvallur district having a population of 1,585,280 consists of 795,110 male populations and 790,170 female populations.

Source:

http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Thiruvallur District”,Series-34 Part XII-A)

3.13.1 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure

- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

The following **Table 3-18** provides the certain important social indicators of Thiruvallur district in Tamil Nadu.

Table 3-18 Social Indicators

S.No	Social Indicators	Thiruvallur District
1	Decadal growth rate %	35.3
2	Urban population %	65.1
3	Sex ratio	987
4	0-6 age group %	11.06
5	Population density (Persons per square Km)	400
6	Scheduled caste population %	22.03
7	Scheduled tribe population %	1.26
8	Literacy rate %	84.03
9	Work Participation rate %	41.3
10	Main Workers %	81.1
11	Marginal Workers %	18.86
12	Cultivators %	4.78
13	Agricultural labourers %	17.59
14	Workers in household industries %	3.79
15	Other workers %	73.84

Source:http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Thiruvallur District",Series-34 Part XII-A)

3.13.1.1Population and Household Size

Thiruvallur district having a population of 3,728,104 consists of 1,876,062 male populations and 1,852,042 female populations.

Source:

http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011,Thiruvallur District",Series-34 Part XII-A)

3.13.1.2 Sex Ratio

As per 2011 Census the sex ratio was 987 for every 1,000 males, lower when compared to the State Sex Ratio of 996 in Thiruvallur district. The sex ratio of 0-6 age group was 946 for district.

Source:

http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Thiruvallur District”,Series-34 Part XII-A)

3.13.1.3 Scheduled Caste (SC)

Thiruvallur has a population of 821646 persons belonging to Scheduled Castes which represents 22% of the total population of the district. Of these, 451999 reside in rural areas and that 34.8% of the Scheduled Caste population.

Source:

http://censusindia.gov.in/2011census/dchb/DCHB_A/33/3301_PART_A_DCHB_THIRUVALLUR.pdf

(Ref:Directorate of Census Operations-Tamil Nadu, “District Census Handbook-2011,Thiruvallur District”,Series-34 Part XII-A).

3.13.2 Social Economic Profile of the study area

The villages and towns covering 10 km radius from the boundary of the project site is taken for the study.

Table 3-19 shows the list of locations which comes under the study area.

Table 3-19 Population profile within the study area

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0-5 Km								
Palakkodu Taluk- Dharmapuri District								
1.	Panjapalli	1578	6680	3452	3228	775	833	393
2.	Periyatur	449	1884	974	910	258	380	24
3.	Namandahalli	925	3960	2059	1901	434	525	189
4.	Chinnagowndanahalli	432	1855	962	893	267	136	0
5.	Chudanur	709	2957	1504	1453	337	429	54
6.	Gummanur	682	2752	1420	1332	336	634	0
7.	Samanur	1124	4262	2143	2119	415	600	61
8.	Bodikuttalappally	8	42	23	19	6	0	0
Denkanikottai Taluk- Krishnagiri District								
9.	Thimijapalli	960	4425	2318	2107	557	351	172
10.	Nellur	917	3874	1990	1884	447	492	616
5-10 Km								
Palakkodu Taluk- Dharmapuri District								
11.	Jittandahalli	1536	6215	3183	3032	721	838	210
12.	Mahendramangalam	923	3835	2007	1828	470	374	0
13.	Jakkasamudram	1257	5302	2687	2615	606	777	0
14.	Giddanahalli	249	1019	533	486	113	0	0
15.	Chikkadornabettam	1144	4456	2330	2126	527	433	351
16.	Athimutlu	782	3210	1613	1597	456	530	12
17.	Gendanahalli	792	3171	1614	1557	437	631	355
18.	Marandahalli	503	1927	989	938	256	292	0
19.	Chennanahalli	110	443	233	210	42	4	0
20.	Chikkamarandhahalli	635	2568	1290	1278	293	40	179
21.	Gujjarahalli	1029	4301	2122	2179	436	398	188
22.	Marandahalli (TP) WARD NO.-0001	224	824	417	407	86	22	0
23.	Marandahalli (TP) WARD NO.-0002	392	1633	793	840	206	63	0
24.	Marandahalli (TP) WARD NO.-0003	238	961	485	476	100	15	0
25.	Marandahalli (TP) WARD NO.-0004	227	833	432	401	87	0	0

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
26.	Marandahalli (TP) WARD NO.-0005	117	499	252	247	46	0	1
27.	Marandahalli (TP) WARD NO.-0006	173	628	303	325	68	9	0
28.	Marandahalli (TP) WARD NO.-0007	203	840	411	429	91	0	0
29.	Marandahalli (TP) WARD NO.-0008	135	496	244	252	45	0	0
30.	Marandahalli (TP) WARD NO.-0009	156	618	302	316	53	507	0
31.	Marandahalli (TP) WARD NO.-0010	189	750	379	371	86	12	0
32.	Marandahalli (TP) WARD NO.-0011	123	488	242	246	45	41	0
33.	Marandahalli (TP) WARD NO.-0012	422	1692	851	841	197	471	0
34.	Marandahalli (TP) WARD NO.-0013	230	879	434	445	90	4	0
35.	Marandahalli (TP) WARD NO.-0014	184	719	368	351	77	5	0
36.	Marandahalli (TP) WARD NO.-0015	166	591	298	293	51	4	0
Denkanikottai Taluk- Krishnagiri District								
37.	Nagamangalam	1115	4948	2502	2446	577	650	57
38.	Udedurgam	763	3441	1780	1661	412	818	206
39.	Muthanhalli	727	3157	1623	1534	333	456	302
40.	T.Gollahalli	305	1255	653	602	148	183	0
41.	Karukkanahalli	1369	6006	3103	2903	776	414	74
42.	Sengodachinnahalli	1007	4197	2219	1978	559	0	2
43.	Suligunta	1203	5353	2816	2537	749	72	0
44.	Rayakotta	2043	8593	4282	4311	1043	466	15
45.	Pillari Agraharam	1607	6718	3504	3214	842	592	0
46.	Bevunutham	823	3768	1985	1783	457	300	3
47.	Echanahalli	64	283	146	137	48	0	0
48.	Odayandahalli	1067	4566	2354	2212	520	778	56

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
49	Hanumanthapuram	1125	5241	2712	2529	705	652	739
50	Rathnagiri	505	2342	1221	1121	305	369	127
Hosur Taluk- Krishnagiri District								
51	Ayaranapalli	1171	4986	2578	2408	558	768	702
Krishnagiri Taluk- Krishnagiri District								
52	Chikkapoovathi	586	2405	1205	1200	297	388	325
53	Total	35403	148848	76340	72508	17846	16756	5413

(Source: Census 2011)

3.12.2.1 Employment and Livelihood within study area

Majority of population in the study area comes under other working categories. As agriculture cannot be a main sustenance for most of farmers, they have dual professions. Farming is mostly seasonal, they involve in other livelihood activities like business, non-agriculture labour, agriculture labour and other service sectors. Fragmentation of landholding leads to adopt to have additional occupation. Summaries of employment and livelihood within the study are given in **Table 3-20**.

Table 3-20 Summaries of Employment and Livelihood within the study area

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers		Main	Marginal	Main	Marginal
					Main	Marginal	Main	Marginal				
0-5 Km												
Palakkodu Taluk- Dharmapuri District												
1.	Panjapalli	3200	3134	66	871	5	1457	29	40	3	766	29
2.	Periyanur	1078	1063	15	317	3	579	7	2	2	165	3
3.	Namandahalli	2292	2171	121	767	21	1142	39	18	29	244	32
4.	Chinnagowndanahalli	1032	923	109	674	25	190	66	1	3	58	15
5.	Chudanur	1949	1510	439	760	37	222	286	24	11	504	105
6.	Gummanur	1447	1429	18	480	1	655	3	29	3	265	11
7.	Samanur	2311	1935	376	772	51	685	263	26	4	452	58
8.	Bodikuttalappally	23	22	1	8	0	14	0	0	1	0	0
Denkanikottai Taluk- Krishnagiri District												
9.	Thimijapalli	2089	1578	511	594	86	492	171	84	75	408	179
10	Nellur	2287	2175	112	905	7	1097	63	33	1	140	41
5-10 Km												
Palakkodu Taluk- Dharmapuri District												
11	Jittandahalli	3519	3387	132	1636	16	1415	104	6	0	330	12
12	Mahendramangalam	2149	2076	73	601	7	969	45	7	2	499	19
13	Jakkasamudram	2449	2233	216	770	44	688	25	34	1	741	146
14	Giddanahalli	469	465	4	202	0	143	1	0	1	120	2
15	Chikkadornabettam	2525	2344	181	697	3	1150	25	26	62	471	91
16	Athimutlu	1815	1669	146	489	2	879	138	5	0	296	6
17	Gendanahalli	1718	1669	49	577	5	464	30	20	0	608	14
18	Marandahalli	1098	932	166	296	6	193	133	7	3	436	24
19	Chennanahalli	207	207	0	44	0	87	0	4	0	72	0
20	Chikkamarandhahalli	1176	622	554	313	102	104	182	8	16	197	254
21	Gujjarahalli	1945	1465	480	389	5	533	311	32	21	511	143
22	Marandahalli (TP) WARD NO.-0001	492	448	44	18	2	12	16	1	0	417	26
23	Marandahalli (TP) WARD NO.-0002	620	392	228	30	1	10	21	9	14	343	192
24	Marandahalli (TP) WARD NO.-	331	322	9	10	1	7	1	20	2	285	5

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers		Main	Marginal	Main	Marginal
					Main	Marginal	Main	Marginal				
	0003											
25	Marandahalli (TP) WARD NO.-0004	375	343	32	1	0	8	2	7	4	327	26
26	Marandahalli (TP) WARD NO.-0005	197	174	23	5	0	3	1	7	2	159	20
27	Marandahalli (TP) WARD NO.-0006	206	187	19	0	0	2	0	9	2	176	17
28	Marandahalli (TP) WARD NO.-0007	307	305	2	14	0	68	0	8	1	215	1
29	Marandahalli (TP) WARD NO.-0008	229	207	22	29	0	4	0	0	4	174	18
30	Marandahalli (TP) WARD NO.-0009	249	47	202	4	5	1	0	0	5	42	192
31	Marandahalli (TP) WARD NO.-0010	405	379	26	7	2	24	1	33	5	315	18
32	Marandahalli (TP) WARD NO.-0011	157	155	2	8	0	7	0	7	0	133	2
33	Marandahalli (TP) WARD NO.-0012	820	708	112	14	3	156	50	116	5	422	54
34	Marandahalli (TP) WARD NO.-0013	364	354	10	10	0	76	3	59	1	209	6
35	Marandahalli (TP) WARD NO.-0014	254	203	51	11	1	31	12	4	22	157	16
36	Marandahalli (TP) WARD NO.-0015	257	232	25	22	1	4	7	3	5	203	12
Denkanikottai Taluk- Krishnagiri District												
37	Nagamangalam	2617	2326	291	1151	73	734	97	53	45	388	76
38	Udedurgam	2079	1844	235	796	20	763	173	7	5	278	37
39	Muthanhalli	1771	1676	95	712	10	680	26	38	4	246	55
40	T.Gollahalli	554	297	257	26	4	4	5	52	237	215	11
41	Karukkanahalli	3497	3021	476	1739	178	758	129	113	15	411	154
42	Sengodachinnahalli	1979	1804	175	1168	34	438	83	10	4	188	54

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers		Main	Marginal	Main	Marginal
					Main	Marginal	Main	Marginal				
43	Suligunta	3156	2695	461	1817	135	590	217	13	6	275	103
44	Rayakotta	3989	2921	1068	232	50	327	85	256	118	2106	815
45	Pillari Agraharam	3982	3562	420	2475	9	646	327	64	28	377	56
46	Bevunutham	2072	1852	220	1161	38	591	145	32	1	68	36
47	Echanahalli	151	149	2	139	0	0	0	1	0	9	2
48	Odayandahalli	2578	2096	482	1126	74	455	99	69	187	446	122
49	Hanumanthapuram	2983	2694	289	1011	217	1367	65	17	1	299	6
50	Rathnagiri	1321	840	481	584	183	232	262	3	7	21	29
Hosur Taluk- Krishnagiri District												
51	Ayaranapalli	2628	2422	206	1167	33	357	113	13	3	885	57
Krishnagiri Taluk- Krishnagiri District												
52	Chikkapoovathi	1231	960	271	380	14	489	220	9	5	82	32
	Total	78629	68624	10005	28029	1514	22002	4081	1439	976	17154	3434

(Source: Census 2011)

3.12.2.2 Educational Infrastructure within study area

The district has good primary and secondary education infrastructure in urban and rural areas. The people around the study area have well connected to educational infrastructures. The educational facilities in the study area are summarized in **Table 3-21**.

Table 3-21 Details of Education facilities within study area

S. No	Type of School	Numbers
1	Government Pre-Primary school	35
2	Private Pre-Primary school	57
3	Government Primary school	58
4	Private Primary school	78
5	Government Middle school	72
6	Private Middle school	82
7	Government Secondary school	81
8	Private Secondary school	82
9	Government Senior Secondary school	87
10	Private Senior Secondary school	87

(Source: Census 2011)

The following Table 3-22 shows the literates population and the percentage within the study area.

**Table 3-22 Literates population and the percentage within the study area**

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
0-5 Km								
Palakkodu Taluk- Dharmapuri District								
1	Panjaballi	6680	3605	2139	1466	3075	1313	1762
2	Periyapur	1884	965	582	383	919	392	527
3	Namandahalli	3960	2156	1298	858	1804	761	1043
4	Chinnagowdanahalli	1855	802	478	324	1053	484	569
5	Chudanur	2957	1675	979	696	1282	525	757
6	Gummanur	2752	1534	907	627	1218	513	705
7	Samanur	4262	2531	1427	1104	1731	716	1015
8	Bodikuttalapally	42	17	10	7	25	13	12
Denkanikottai Taluk- Krishnagiri District								
9	Thimijapalli	4425	2156	1256	900	2269	1062	1207
10	Nellur	3874	1971	1148	823	1903	842	1061
5-10 Km								
Palakkodu Taluk- Dharmapuri District								
11	Jittandahalli	6215	3026	1765	1261	3189	1418	1771
12	Mahendramangalam	3835	2058	1220	838	1777	787	990
13	Jakkasamudram	5302	3221	1878	1343	2081	809	1272
14	Giddanahalli	1019	468	271	197	551	262	289
15	Chikkadornabettam	4456	2420	1423	997	2036	907	1129
16	Athimutlu	3210	1626	941	685	1584	672	912
17	Gendanahalli	3171	1583	904	679	1588	710	878
18	Marandahalli	1927	911	562	349	1016	427	589
19	Chennanahalli	443	269	150	119	174	83	91

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
20	Chikkamarandhalli	2568	1531	878	653	1037	412	625
21	Gujjarahalli	4301	2680	1445	1235	1621	677	944
22	Marandahalli (TP) WARD NO.-0001	824	552	308	244	272	109	163
23	Marandahalli (TP) WARD NO.-0002	1633	1157	605	552	476	188	288
24	Marandahalli (TP) WARD NO.-0003	961	745	404	341	216	81	135
25	Marandahalli (TP) WARD NO.-0004	833	572	323	249	261	109	152
26	Marandahalli (TP) WARD NO.-0005	499	341	180	161	158	72	86
27	Marandahalli (TP) WARD NO.-0006	628	469	250	219	159	53	106
28	Marandahalli (TP) WARD NO.-0007	840	509	279	230	331	132	199
29	Marandahalli (TP) WARD NO.-0008	496	399	210	189	97	34	63
30	Marandahalli (TP) WARD NO.-0009	618	422	227	195	196	75	121
31	Marandahalli (TP) WARD NO.-0010	750	490	271	219	260	108	152
32	Marandahalli (TP) WARD NO.-0011	488	363	192	171	125	50	75
33	Marandahalli (TP) WARD NO.-0012	1692	970	529	441	722	322	400
34	Marandahalli (TP) WARD NO.-0013	879	609	316	293	270	118	152
35	Marandahalli (TP) WARD NO.-0014	719	450	240	210	269	128	141
36	Marandahalli (TP) WARD NO.-0015	591	407	232	175	184	66	118

Sl. No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
Denkanikottai Taluk- Krishnagiri District								
37	Nagamangalam	4948	2675	1559	1116	2273	943	1330
38	Udedurgam	3441	1792	1041	751	1649	739	910
39	Muthanhalli	3157	1999	1171	828	1158	452	706
40	T.Gollahalli	1255	780	446	334	475	207	268
41	Karukkanahalli	6006	3113	1838	1275	2893	1265	1628
42	Sengodachinnahalli	4197	1711	1076	635	2486	1143	1343
43	Suligunta	5353	2424	1495	929	2929	1321	1608
44	Rayakotta	8593	5717	3076	2641	2876	1206	1670
45	Pillari Agraharam	6718	3476	2120	1356	3242	1384	1858
46	Bevunutham	3768	1935	1157	778	1833	828	1005
47	Echanahalli	283	133	79	54	150	67	83
48	Odayandahalli	4566	2597	1566	1031	1969	788	1181
49	Hanumanthapuram	5241	2667	1578	1089	2574	1134	1440
50	Rathnagiri	2342	1316	766	550	1026	455	571
Hosur Taluk- Krishnagiri District								
51	Ayaranapalli	4986	2923	1734	1189	2063	844	1219
Krishnagiri Taluk- Krishnagiri District								
52	Chikkapoovathi	2405	1185	682	503	1220	523	697
	Total	148848	82103	47611	34492	66745	28729	38016

(Source: Census 2011)

3.13.3 Summary

The Socioeconomic profile of the study area shows that the majority of people in the study area work in non-agricultural sector, however in rural area majority of the people in the rural area depends on agricultural sector. They have good educational infrastructures and the people in the study

area are well connected to the educational infrastructures. The average literacy rate of the study area is 79.82%. The people in the study area are well connected to Government primary health centres and Primary health sub-centres shows the socio-economic indicators within the study area given in **Table 3-34**.

Table 3-23 Summaries of Socio-economic indicators within the study area

S.No	Particulars	Study area	Unit
0-5 Km			
1	Number of villages in the Study Area	10	Nos.
2	Total Households	7784	Nos.
3	Total Population	32691	Nos.
4	Children Population (<6 Years Old)	3832	Nos.
5	SC Population	4380	Nos.
6	ST Population	1509	Nos.
7	Total Working Population	17708	Nos.
8	Main Workers	15940	Nos.
9	Marginal Workers	1768	Nos.
10	Cultivators	6384	Nos.
11	Agricultural labours	7460	Nos.
12	Household Industries	389	Nos.
13	Other Workers	3475	Nos.
14	Literates	17412	Nos.
15	Illiterates	15279	Nos.
5-10 Km			
1	Number of villages in the Study Area	27	Nos.
2	Number of wards in the Study Area	15	Nos.
3	Total Households	27619	Nos.
4	Total Population	116157	Nos.
5	Children Population (<6 Years Old)	14014	Nos.
6	SC Population	12376	Nos.
7	ST Population	3904	Nos.
8	Total Working Population	60921	Nos.
9	Main Workers	52684	Nos.
10	Marginal Workers	8237	Nos.

11	Cultivators	23159	Nos.
12	Agricultural labours	18623	Nos.
13	Household Industries	2026	Nos.
14	Other Workers	17113	Nos.
15	Literates	64691	Nos.
16	Illiterates	51466	Nos.

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The impacts due to mining operation and its mitigation measures adopted are detailed in this chapter. In general, the opencast mining operations cause environmental problems such as degradation of land, deteriorating air, water and soil quality, affecting the biological and socio-economic environment of the area, if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco-system.

The opencast mining operations involve development of benches, approach roads, haul roads, blasting, excavation and handling & transportation of materials. If adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause environmental degradation and lead to irreversible damage to the ecosystem. Various environmental impacts, which have been identified due to the proposed project, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

- Air quality including Climate
- Noise levels and ground vibrations
- Water resources and quality
- Land use Pattern
- Soil quality
- Flora and Fauna
- Socio-Economic conditions
- Occupational Health.

4.1 Land Environment

The mining operation is in operation since 1988 and extent of lease area is 16.54.0Ha. is Land classifies as a Government poramboke land. The quarry lease was applied quarry lease vide G.O. (3D) No. 52, Industries (MME-1) dept dated 11.11.2011 for 30 years & the lease period is valid up to 15.02.2042. The land use pattern is given in **Table 4-1**.

4.1.1 Land Degradation

The impact on land pattern in the area has been and will be due to

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.

- Exposure of topsoil to wind and water erosion.

Table 4-1 Land Use Pattern of the quarry area

S. No.	Description	Present Area (Ha.)	Area to be required at the present Scheme Period (Ha.)	Area at the end of life of Quarry (Ha.)
1.	Area under Quarrying	2.26.0	10.40.5	13.35.0
2.	Waste Dump	3.23.5	2.65.0	2.65.0
3.	Infrastructure	0.02.5	0.02.5	0.01.5
4.	Village Roads	0.07.0	0.07.0	0.07.0
5.	Mine approach road	1.39.0	0.30.0	0.03.5
6.	Green Belt	0.12.5	Over waste dump	Over waste dump
7.	Unutilized	9.43.5	3.09.0	0.42.0
Total		16.54.0	16.54.0	16.54.0

4.1.2 Mitigation Measures

- Dust suppression on exposed areas using water tankers and automatic sprinkling systems
- Contour overburden dump to minimize erosion
- Plantation using native plant sapling.
- Compliance with mine decommissioning plan.
- Drainage control structures like garland drain to be made around OB dump area to avoid water flow during monsoon below the OB dump.
- Leveling, grading and drainage arrangement for top of OB dumps.
- Topsoil to be stored in small heaps (5m high) at appropriate moisture content with proper vegetation.
- Top soil shall be used in afforestation work, as early as possible.
- Top soil will be removed & stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.
- After complete extraction of estimated reserves of black granite. The deeper working pits, after completion of Mining /Quarrying left as it is, which would serve as water ponds/ water reservoirs.
- The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle's.
- Management plan for topsoil utilization and conservation.
- Progressive year-wise green belt development inside and outside the lease area.

4.2 Air Environment

The main source of air pollution is from open cast mining activities is dust generation from excavation of granite, movement of vehicles for transportation of product to consumers, drilling, loading and unloading operation and wind erosion of dumps and also gaseous emission due to operation of diesel driven mining equipment. The sources of air emission are detailed below in **Table 4-2**.

Table 4-2 - Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

Baseline data reveals that ambient air quality in the study area for the Parameters SPM, SO₂& NO_x, are well within the permissible Limits as prescribed by the National Ambient Air Quality Standards (NAAQS) for Industrial Area, Residential, Rural & Other areas.

The major air pollution sources from the mining operations are DG sets, Mining activities like blasting, drilling, cutting etc., and transportation. The DG set are provided with stacks of adequate height so as to disperse the emanating flue gases containing suspended particulate matters, oxides of sulphur and nitrogen without affecting the ground level concentrations. The emissions mainly generated from the existing dimension stone quarry mining activities are DG sets, mining activities, and transportation.

4.2.1 Mitigation measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Usage of Wire saw machine to reduce blasting and drilling.
- Delay blasting under unfavorable wind and atmospheric conditions

The production of blast fumes containing noxious gases will be reduced by the following methods:

- Use of adequate booster/primer
- Proper stemming of the blast hole.
- Drills fitted with dust collection system to be deployed or using wet drilling method.
- Development of greenbelt.

Table 4-3 Fugitive dust control in mine

S. No	Activities	Best practices
1	Drilling	➤ Drills should be provided with dust extractors (dry or wet)

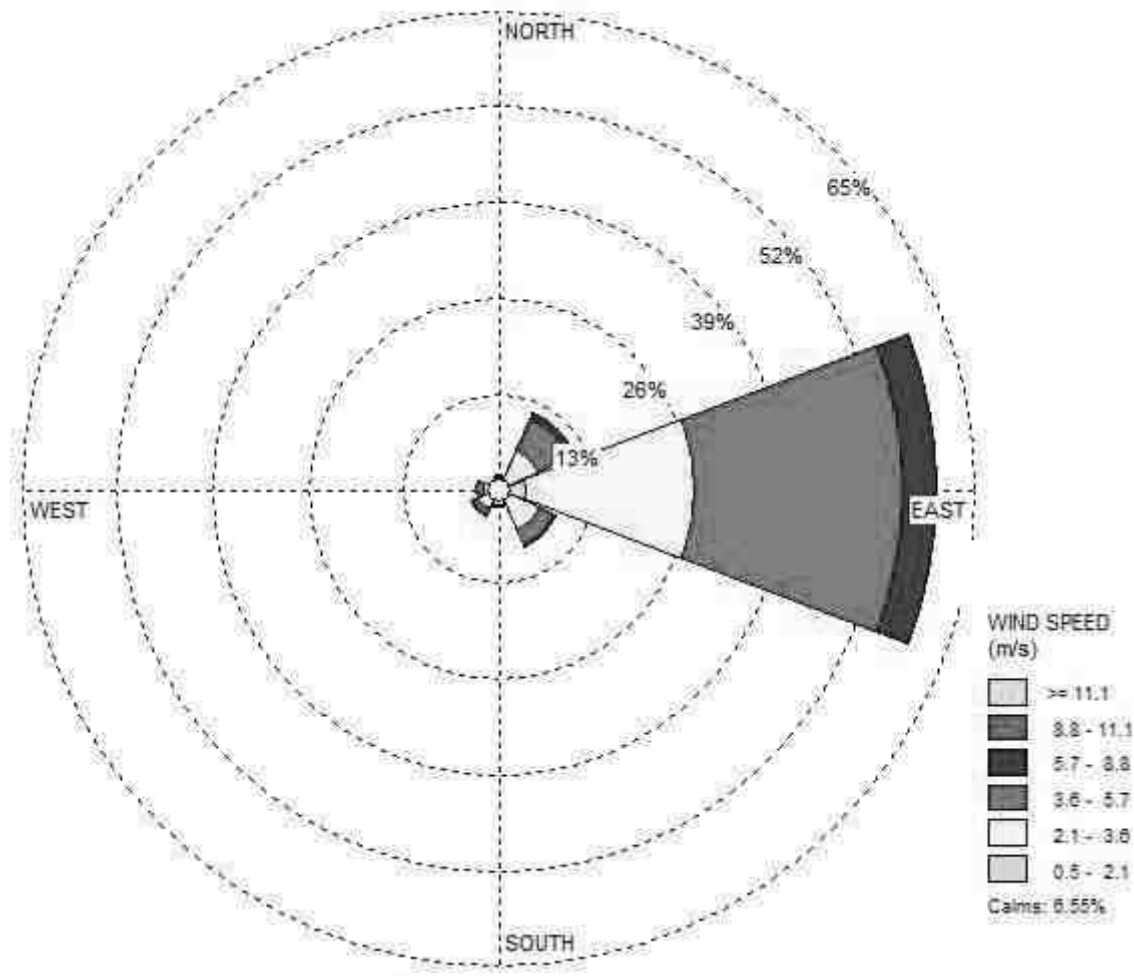
		system)
2	Blasting	<ul style="list-style-type: none"> ➤ Water spray before blasting ➤ Water spray on blasted material prior to transportation ➤ Use of controlled blasting technique
3	Transportation of mined material	<ul style="list-style-type: none"> ➤ Covering of the trucks/dumpers to avoid spillage ➤ Compacted haul road ➤ Speed control on vehicles ➤ Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust

Table 4-4 Dust control measures in quarry

S. No	Operation or source	Control options
1	Drilling	<ul style="list-style-type: none"> ➤ Liquid injection (water or water plus a wetting agent) ➤ Capturing and venting emissions to a control device.
2	Blasting	<ul style="list-style-type: none"> ➤ Water spray before blasting ➤ Water spray on blasted material prior to transportation ➤ Use of controlled blasting technique
3	Loading	<ul style="list-style-type: none"> ➤ Water spray
4	Hauling (emissions from roads)	<ul style="list-style-type: none"> ➤ Water spray, treatment with surface agents, soil stabilization, paving, traffic control.
5	Windblown dust from roads	<ul style="list-style-type: none"> ➤ Oiling surface active agents, soil stabilization, paving, sweeping.

4.2.1.1 Meteorological Data

The site specific meteorological data for three months from Mid January 2023 to Mid April 2023 was obtained from secondary sources and processed in AERMET to plot wind rose diagram (Fig 4.3.1). Other data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformats meteorological data so that it can be used as input for AERMOD model.



**Figure 4-1 Wind rose diagram considered for Dispersion Modeling
(Jan mid.2023 to April mid.2023)**

4.2.1.2 AERMET Process

For the 3 phase AERMET processing of the meteorological data, specifications of the land use in the area are required to determine the terrain roughness for modeling. The land use was characterized for in and around the site. The surface characteristics for the site and surroundings were selected and used to calculate the Albedo, Bowen ratio and surface roughness parameter.

The meteorological data were processed in the AERMET software to generate wind flow pattern & to generate surface meteorological data and profile meteorological data in a prescribed format that can be fed to AERMOD for modeling.

4.2.1.3 AERMOD Process

AERMOD Software Version 8.0.5 was used for air dispersion modeling and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straight forward cases, AERMOD is also suitable for complex terrain and urban dispersion scenarios.

AERMOD is a steady-state plume model. In the stable boundary layer (SBL), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the convective boundary layer (CBL), the horizontal distribution is also assumed to be Gaussian, but the vertical distribution is described with a bi-Gaussian probability density function (pdf). This behavior of the concentration distributions in the CBL was demonstrated by Willis and Deardorff (1981) and Briggs (1993). Additionally, in the CBL, AERMOD treats “plume lofting,” whereby a portion of plume mass, released from a buoyant source, rises to and remains near the top of the boundary layer before becoming mixed into the CBL. AERMOD also tracks any plume mass that penetrates into the elevated stable layer, and then allows it to re-enter the boundary layer when and if appropriate. For sources in both the CBL and the SBL, AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions mainly generated from the mining activities are Blasting, Drilling, Scrapping, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling are estimated and used as inputs for the air dispersion modelling as shown in **Table 4-5** to **Table 4-6**.

Maximum incremental value for SO₂, NO_x and PM are shown in **Figures 4-2to4-4** and Top 10 highest Ground Level Concentration (GLC) obtained from modeling are given in **Table 4-7 & 4-9** respectively.

Emission Calculations

Each mining activities is a source of emission and the estimation of emissions depends on parameters such as meteorological, topographic conditions and material characteristics. It is necessary to calculate the amount of emission for work or a source on site to the atmosphere. The following emission formulas are used to calculate the emission rate for the different emission source.

Source:

1. Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals by NPI, Nov 1999
2. Determination of the emission rate from various opencast mining operations, S. K. CHAULYA*, M. K. CHAKRABORTY, et. Al. *Water, Air, and Soil Pollution 140: 21–55, 2002.*
3. Chaulya, S., 2006. Emission rate formulae for surface iron mining activities. *Environmental Modeling Assessment*, Issue 11, pp. 361-370.
4. EPA. August, 2004. Section 11.19.2, *Crushed Stone Processing and Pulverized Mineral Processing. In: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition, AP-42. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.*

Table 4-5 Overview of the Source Parameters

S. NO	Description	Symbol	Quantity
-------	-------------	--------	----------

1	Moisture Content (%)	m	1.64
2	Silt Content (%)	s	6
3	Production / Day (Tonn/Day)		30
4	Waste Dumping Area (Sq.Km)	a	0.0265
5	Open Pit Area (Sq. Km)	Aa	0.104

Table 4-6 Emission from Mining Equipments

Source	Fuel used	Stack Details					Emissions (g/s)			
		No of Stack	Height (m) AGL	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM ₁₀	PM _{2.5}	SO ₂	NO _x
DG (125 kVA)	Diesel	1	3	0.3	180	10	5.81E-03	3.48E-03	5.38E-03	8.16E-02

Table 4-7 Vehicular Sources Emission details

Source	Emission (g/s)		
	PM ₁₀	PM _{2.5}	NO _x
4 Wheeler (1 no.)	6.94E-05	4.17E-05	6.94E-04
Heavy Duty Vehicles (2 no.)	1.11E-04	6.67E-05	1.94E-02
Total	1.81E-04	1.08E-04	2.01E-02

Table 4-8 Emission Considered for Mining Activity

Activities	TSPM Emission rate	PM ₁₀ Emission rate	PM _{2.5} Emission rate
Wet Drilling (g/s)	3.12E-06	6.25E-07	3.75E-07
Haulage (g/s)	2.59E-04	5.19E-05	3.11E-05
Waste Dumping (g/s)	1.25E-05	2.51E-06	1.50E-06
Open Pit (g/s.m ²)	3.43E-05	6.87E-06	4.12E-06

Table 4-9 Emission input for modeling

Activities	TSPM	PM ₁₀	PM _{2.5}	SO ₂	NO _x
Line Source (Haul Road) (g/s)	2.59E-04	5.19E-05	3.11E-05	-	-
Area Source (Open Pit) (g/s.m ²)	3.43E-05	6.87E-06	4.12E-06	-	-
Area Source (Waste Dumping) (g/s)	1.25E-05	2.51E-06	1.50E-06	-	-
Point Source (DG) (g/s)	-	5.81E-03	3.48E-03	5.38E-03	8.16E-02
Point Source (Drilling) (g/s)	3.12E-06	6.25E-07	3.75E-07	-	-
Line Source (Vehicle) (g/s)	-	1.81E-04	1.08E-04	-	2.01E-02

Note:

a. Since emission factors are available for PM₁₀ the following assumptions are made for PM₁₀ and PM_{2.5} estimation

1. TSPM is considered as 5 times of PM₁₀

2. 60% of PM₁₀ is considered as PM_{2.5}

b. Emission calculation is done for total production.

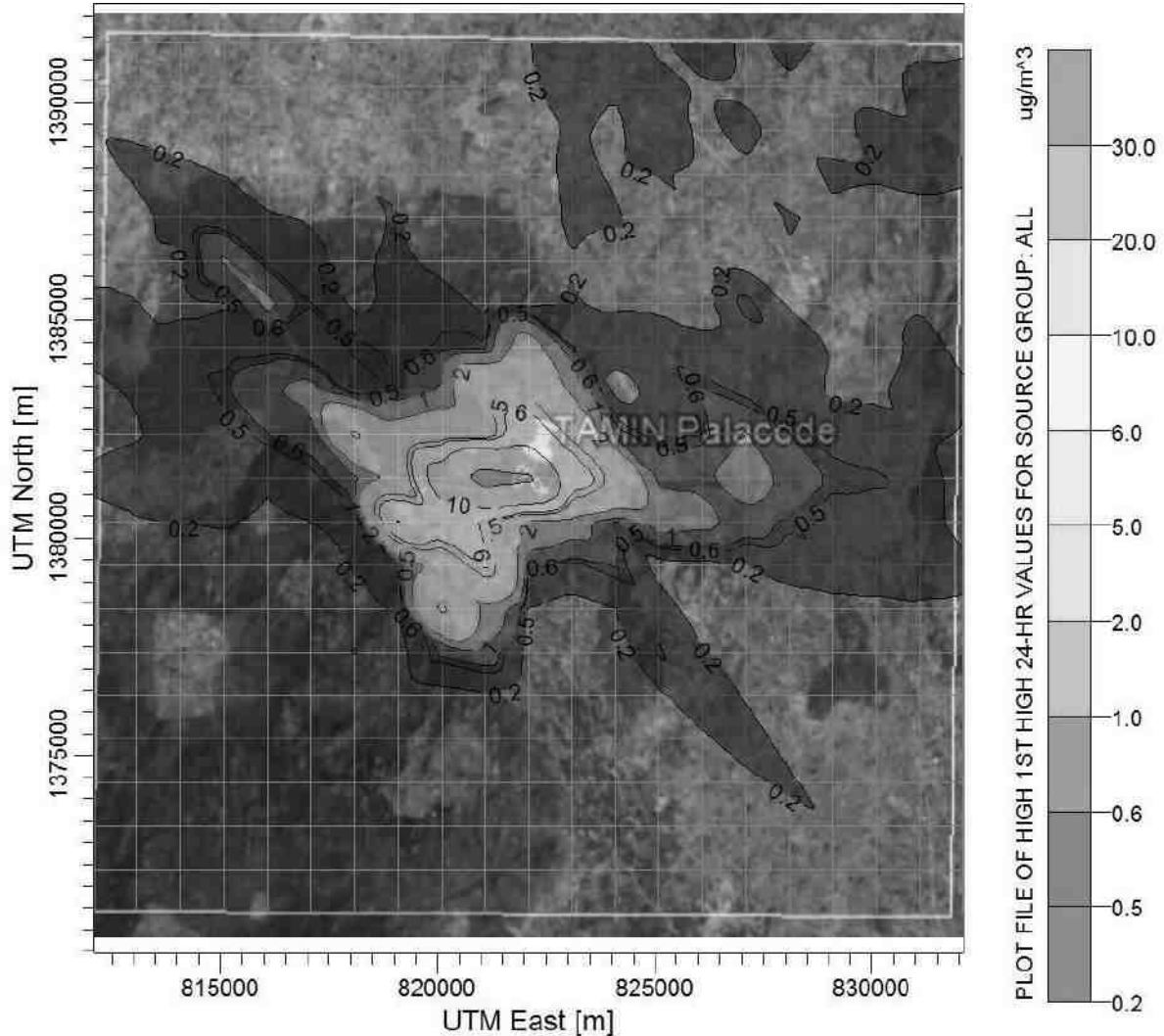


Figure 4-2 Predicted 24 hrs GLC's of TSPM within 10 km radius of the Study area

Table 4-10 Predicted Top 10 Highest Concentration of TSPM

S.NO	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	821087	1381377	23.89227	1	W
2.	822087	1381377	21.41594	Project Site	Project Site
3.	820087	1381377	13.6323	2	W
4.	819087	1380377	10.12166	3.16	WSW
5.	823087	1381377	7.94066	1	E
6.	822087	1382377	7.93669	1	N
7.	820087	1380377	7.66859	2.24	WSW

8.	821087	1379377	6.36656	2.24	SSW
9.	821087	1380377	5.61576	1.41	SW
10.	820087	1378377	5.44672	3.60	SSW

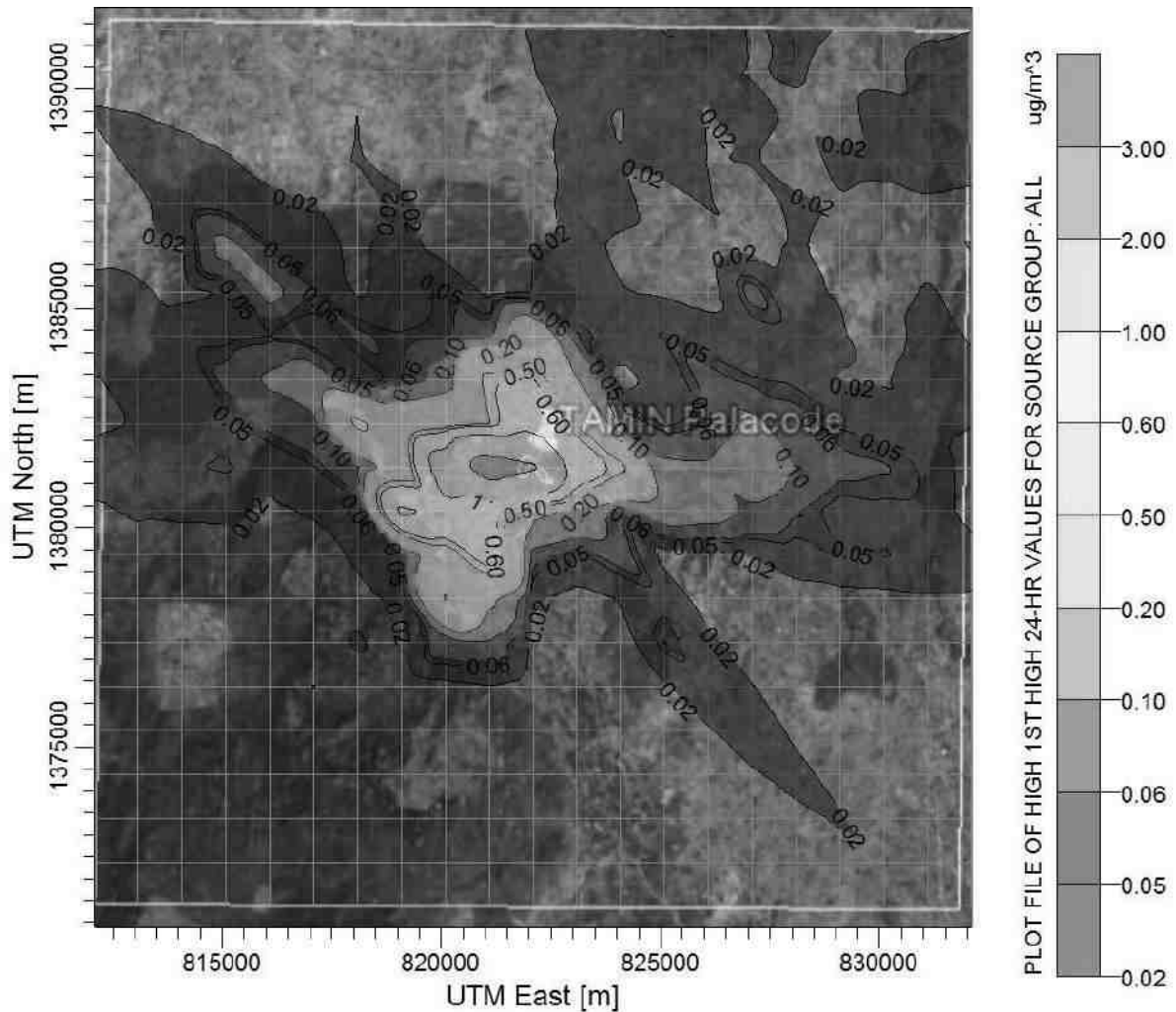


Figure 4-3 Predicted 24 hrs GLC's of PM₁₀ within 10 km radius of the Study area

Table 4-11 Predicted Top 10 Highest Concentration of PM₁₀

S.NO	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	821087	1381377	2.62779	1	W
2.	822087	1381377	2.11147	Project Site	Project Site
3.	820087	1381377	1.39918	2	W
4.	819087	1380377	1.08033	3.16	WSW
5.	820087	1380377	0.89732	2.24	WSW

6.	822087	1382377	0.88822	1	N
7.	823087	1381377	0.88308	1	E
8.	821087	1379377	0.77552	2.24	SSW
9.	821087	1380377	0.69511	1.41	SW
10.	822087	1383377	0.61257	2	N

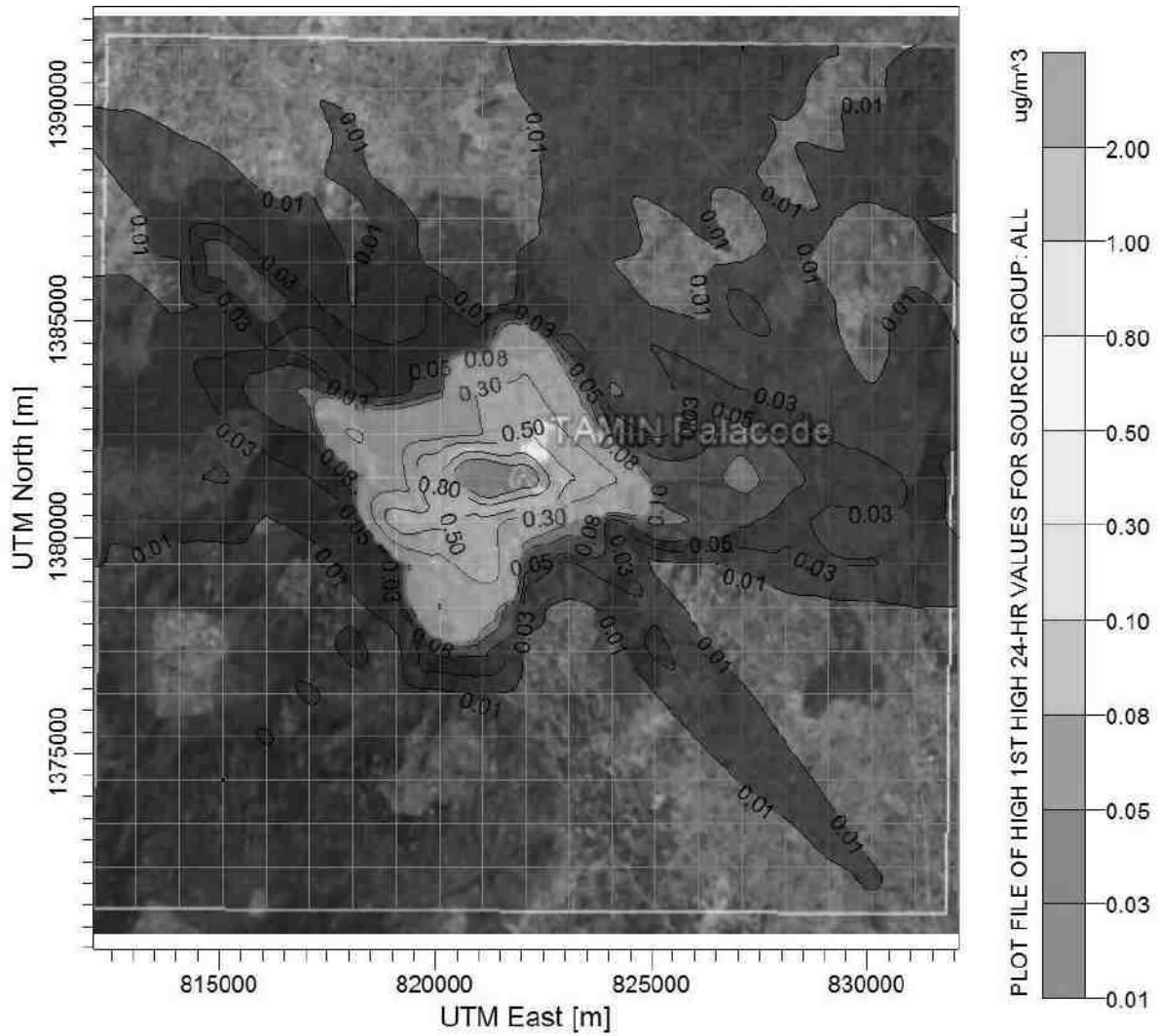


Figure 4-4 Predicted 24-Hrs' GLC's of PM_{2.5} within 10 km Radius of the Study Area

Table 4-12 Predicted Top 10 Highest Concentration of PM_{2.5}

S.NO	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	821087	1381377	1.57588	1	W
2.	822087	1381377	1.26624	Project Site	Project Site
3.	820087	1381377	0.83907	2	W
4.	819087	1380377	0.64785	3.16	WSW
5.	820087	1380377	0.53811	2.24	WSW

6.	822087	1382377	0.53265	1	N
7.	823087	1381377	0.52957	1	E
8.	821087	1379377	0.46508	2.24	SSW
9.	821087	1380377	0.41685	1.41	SW
10.	822087	1383377	0.36736	2	N

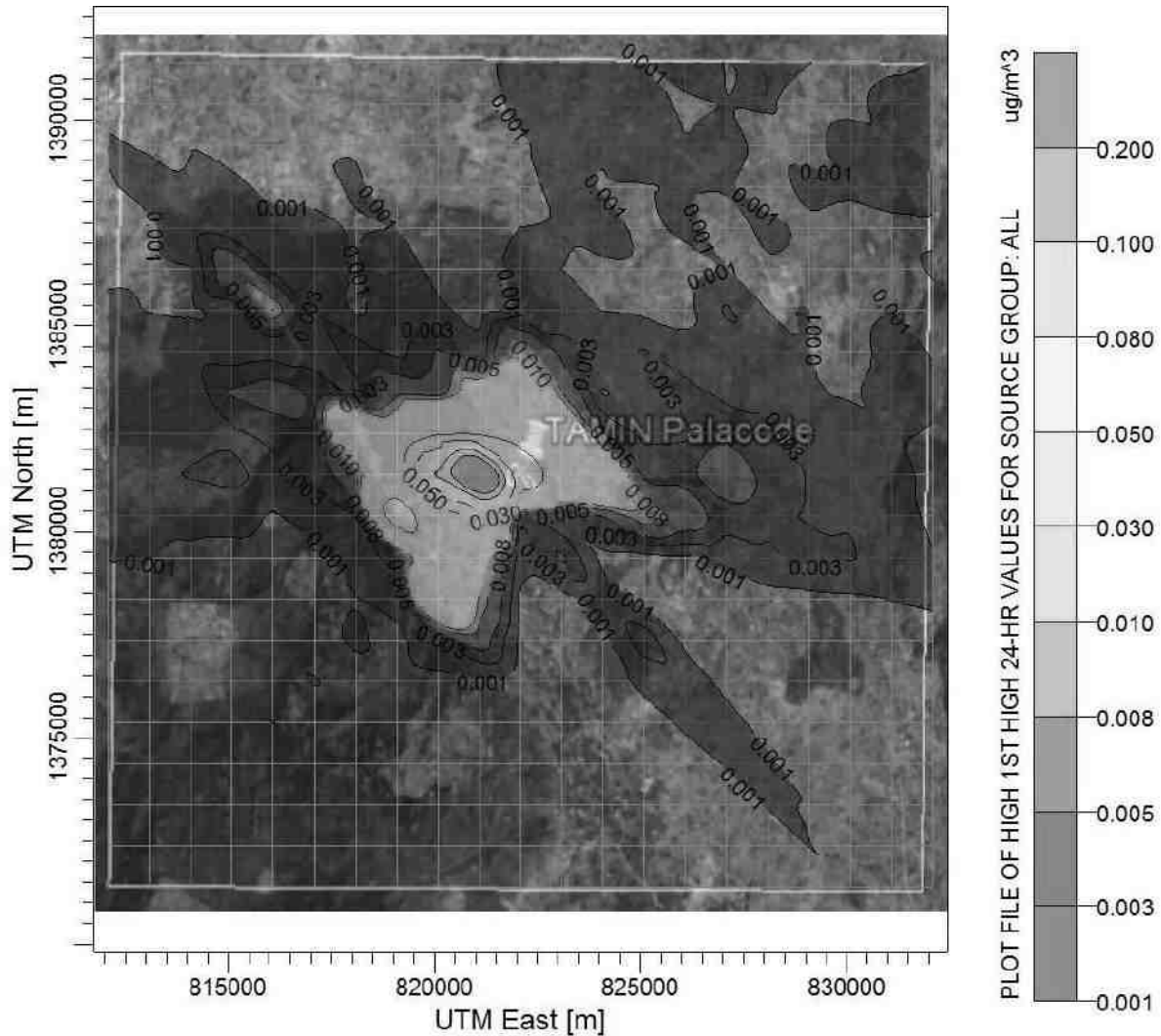


Figure 4-5 Predicted 24-Hrs' GLC's of SO₂ within 10 km Radius of the Study Area

Table 4-13 Predicted Top 10 Highest Concentration of SO₂

S.NO	UTM coordinates (m)		Conc. (µg/m ³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	821087	1381377	0.16269	1	W
2.	820087	1381377	0.08507	2	W
3.	822087	1381377	0.045	Project Site	Project Site
4.	819087	1380377	0.04074	3.16	WSW
5.	821087	1380377	0.03244	1.41	SW

6.	821087	1382377	0.02956	1.41	NW
7.	820087	1382377	0.02877	2.24	WNW
8.	820087	1378377	0.02551	3.60	SSW
9.	822087	1382377	0.02502	1	N
10.	818087	1382377	0.02354	4.12	WNW

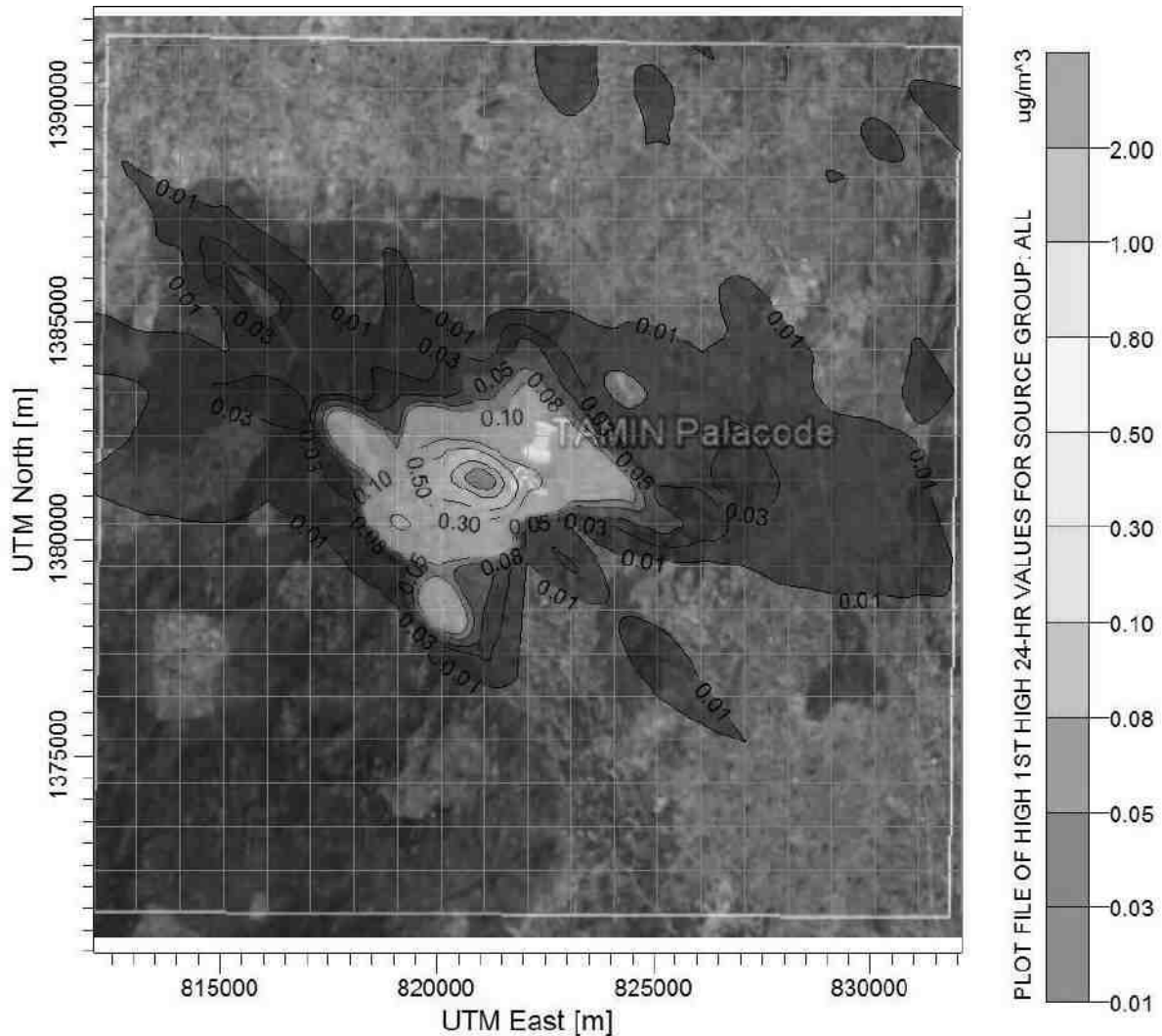


Figure 4-6 Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 4-14 Predicted Top 10 Highest Concentration of NO_x

S.NO	UTM coordinates (m)		Conc. (ug/m ³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	821087	1381377	1.25282	1	W
2.	820087	1381377	0.75876	2	W
3.	822087	1381377	0.38577	Project Site	Project Site
4.	819087	1380377	0.34696	3.16	WSW
5.	821087	1380377	0.26314	1.41	SW

6.	820087	1382377	0.25579	2.24	WNW
7.	820087	1380377	0.21823	2.24	WSW
8.	818087	1382377	0.21281	4.12	WNW
9.	820087	1378377	0.19397	3.60	SSW
10.	823087	1381377	0.17209	1	E

4.2.2 Conclusion:

The total increase in concentrations above baseline status to estimate the percentage increase is summarized in **Table 4-15**.

Table 4-15 Total Maximum GLCs from the Mining Emissions

Pollutant	Max. Base Line Conc. ($\mu\text{g}/\text{m}^3$)	Estimated Incremental Conc. ($\mu\text{g}/\text{m}^3$)	Total Conc. ($\mu\text{g}/\text{m}^3$)	NAAQ standard	% contribution of concentration above Base line
TSPM	152.53	23.89	176.42	500	15.66
PM ₁₀	61.01	2.62	63.63	100	4.29
PM _{2.5}	41.26	1.57	42.83	60	3.81
SO ₂	14.48	0.16	14.64	80	1.10
NO _x	34.08	1.25	35.33	80	3.67

4.3 Impacts due to Transportation

The Granite dimensional blocks are transported to consumer directly as per buyer's requirement. The mine is in operation since 1998 and granite is being transported through existing road by trippers and approx. no. of trips required is 2 times per week. This minimum trip does not create impact on existing transportation.

4.3.1 Mitigation Measures

The increment in the dust emissions will be mainly due to transportation activity. Therefore emissions due to mineral handling during mining operation are not much and restricted to the lease area only. Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:

- Regular water sprinkling on haul and access roads.
- Haul roads to be maintained by surface grading to minimize excessive road surface wearing.
- Watering of haul roads and other roads at regular intervals
- Provision of green belt by vegetation for trapping dust.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

4.4 Water Environment

The existing water environment quality has been studied and the study results are discussed in Chapter-III, which show that generally the water quality in the area is well within statutory standards.

The major sources of water pollution due to this quarry operation will be as below:

- Domestic effluent from the mine.
- Wastewater from Machineries cooling
- Mine discharge water pumped out from the mines
- Reduction in groundwater availability
- Due to poor aquifer condition the impact on water level will be confined to few hundred.
- Deterioration in surface / ground water quality of receiving body.
- Reduction in surface and groundwater availability for domestic and for irrigation purposes.
- Changes to hydraulic regime.

4.4.1 Wastewater Generation

There is no process effluent generation; the negligible quantity of domestic sewage of 0.42KLD is disposed through septic tank.

4.4.2 Mitigate Measures

Surface Water Pollution Control Measures

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.
- During monsoon season, the rain water is being collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.
- The dump tops will be provided with inner slopes to control water flow to prevent erosion washouts. The dumps tops and slopes of in active areas will be covered with grasses, shrubs, mulching, etc, to prevent erosion,
- Retaining walls of adequate dimensions will be provided at the top of dumps and the unstable OB benches within the mine to prevent wash off from dumps and sliding of material from benches. This will help in preventing silting of water drains/channels
- The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water
- The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes.
- The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB

Ground Water Pollution Control Measures

- The domestic sewage from the canteen and toilets will be routed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

4.4.3 Rain Water Harvesting

- The rainwater is being diverted towards the middle of the mine to prevent water entering the mine working. The rainwater flows will also contain fines both from surface and waste dumps during seasonal flows. As such, it is being proposed to have structures in such a way to act as settling pond and also for rainwater harvesting.
- Construct barriers at suitable intervals along the path of the drains.
- Divert the water to de-silting cum rainwater harvesting pond in the mine area.
- Provide necessary overflow arrangement to maintain the natural drainage system.

4.5 Drainage pattern and Hydrogeology

- Catchment area inside the mine will be affected.

4.5.1 Mitigation measures

The study has recommended new alignment in line with upstream drainage slope of the area to facilitate smooth entry of water into the diversion channel and ultimate discharge of water into the original stream. No reduction in surface run-off is envisaged.

4.6 Impact of Noise / Vibrations & Mitigation Measures

4.6.1 Impact of Noise on Working Environment

The main sources of noise in the mine are as follows:

- Transportation vehicles
- Loading & unloading of minerals.
- Drilling

4.6.2 Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in **Table 4-14**.

Table 4-16 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

S. No	Sound Level (dBA)	Continuous Duration (Hours)
1	85	8
2	88	4
3	91	2
4	94	1
5	97	0.5
6	100	0.25

4.6.3 Noise Due to Blasting

The main sources of noise in quarrying activity are drilling & Excavators. The blasting activity being minimum, the noise generated will be minimal. The blasting effect will be contained within the quarry lease area. Blasting activities are involved in this Quarry as green belt will be developed around the mine which restricts the propagation of noise.

Following mitigation measures should be taken to control noise pollution:

- Plan Blasting in a way keeping the atmospheric conditions to reduce the fallout.
- Controlled blasting techniques to be utilised.
- Wherever the noise levels exceed 85 dB A, workers should be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the Vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the drivers of the vehicles shall be avoided.

4.6.4 Noise Impact Analysis on Community

In Industrial area day time noise levels was about 53.6 dB (A) and 42.7 dB(A) during night time, which is within prescribed limit by MoEF & CC (75 dB (A) Day time & 70 dB(A) Night time).

In residential area day time noise levels varied from 50.7 dB (A) to 54.2dB(A) and night time noise levels varied from 40.3 dB(A) to 43.7 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels in Residential area are all well within the limits.

In summary, it can be stated that the impact on the present noise levels due to mining operations will be restricted to the work zone areas only. The impact on the ambient noise levels will not be felt at the settlement areas due to masking effect with the existing noise levels. Hence, the noise levels impact due to the mining operations on community is insignificant.

4.6.5 Mitigate Measures

- Controlled blasting with proper spacing, burden and stemming will be maintained
- No secondary blasting

- Minimum quantity of detonating fuse will be consumed by using alternatively Excel non-electrical initiation system
- The blasting will be carried out during favourable atmospheric condition and less human activity timings
- The prime movers/diesel engines will be properly maintained
- Provision of sound insulated chambers for the workers deployed on machines (HEMM)
- Proper designing of plant & machinery by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment
- A thick tree belt will be provided in phased manner around the periphery of the mine to attenuate noise
- Trees will be planted on both sides of haul roads
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and reducing the exposure time of workers to the higher noise levels.

4.7 Impact of Vibration

Blasting activities are involved in Granite Quarry operations. The vibration during the moment of machinery will be minimal for a short span that will be well within the prescribed limits. Proposed Peripheral green belt is being developed in 0.21.5 Ha. This will mitigate the Vibration.

4.7.1 Mitigate Measures

- Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
- Safe blasting zones are kept around the periphery of the quarry
- Overcharging will be avoided
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts

4.8 Impact on Human Settlement

The total lease area is 16.54.0 Ha which Government poramboke land. TAMIN obtained the quarry lease was applied quarry lease vide G.O. (3D) No. 52, Industries (MME-1) dept dated 11.11.2011 for 30 years & the lease period is valid up to 15.02.2042. Hence R&R Plan is not required for this Quarry. There are no monuments or places of worships in mine area. Ground vibration and noise pollution is being maintained minimal and confined to the mine area. The quality of water both surface and ground water is good and all parameters of drinking water are as per IS standards. Water quality analysis will be carried out at periodical intervals during post project monitoring. The PM,

NO₂ and SO₂ have been observed to be below the prescribed limit. Noise levels have also been found to be below the permissible limits at all the locations. Further, the noise generated in the lease area will get attenuated due to plantation and green belt all around the lease area. As preventive measures, greenbelt development around the mine lease area will be further strengthening for control of air emission to environment.

All the employees when inducted will be medically examined. Further, they will also be medically examined at periodical interval.

4.9 Biological Environment

4.9.1 Mining activities and their impact on biodiversity

Table 4-17 Impacts on Biodiversity

S. No	Activity	Examples of aspects	Examples of biodiversity impact
1.	Extraction	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2.	Blasting, Digging and hauling	Dust, noise, vibration, water pollution	Disruption of water courses, impacts on aquatic ecosystems due to changes in hydrology and water quality
3.	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation, acid mine drainage
4.	Tailing management	Land clearing, water pollution	Loss of habitat, toxicity, sedimentation, water quality and stream flow
5.	Air emissions	Air pollution	Loss of habitat or species
6.	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil
7.	Building power lines	Land clearing	Loss or fragmentation of habitat
8.	Provision of accommodation	Land clearing, soil and water pollution, waste generation	Loss of habitat, sewage disposal and disease impacts
9.	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope
10.	Population growth	Land clearing or increased hunting	Loss of habitat or species, stress on local and regional resources, pest introduction, clearing
11.	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

4.9.2 Existing Biological Scenario

- Badanavadi, Perumbalamalai, Masakkallu, Bevanurmalai, Makesvaramalai, Kalappambadi, Voddappatti, Pennagaram, North Bargur, Solappadi Reserve Forests are located within the 15km

radius of the project. Other than these, there is one Cauvery Wildlife sanctuary is located at a distance of 7.87km (NNW) within 10km from the mines. There will not be any adverse impact due to mining operations in this lease since only small production is involved from this lease and there will not be any major polluting source from the mining operations. Besides, all necessary mitigation measures will be implemented.

- There is no perennial water body near the site and there will be no discharge of effluent from the mine.
- In the Quarry area or its proximate areas there is no wetland and the natural flow of water not available.
- There is no rare or endangered species
- There are no wild animals in the area. In the post mining stage, proper fencing will be carried in the mined out area to prevent fall of animals in the mine pits.
- No such significantly important medicinal value species within both the ML areas and its nearby region.
- There are no any wetlands, fish breeding grounds, marine ecology nearby the quarry area, which will be affected due to this project.

4.9.3 Mitigate Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

4.10 Flora and Fauna

Activities of Mine development and operations & transportation to end users will cause the following impacts on flora and fauna.

4.10.1 Impact

- Displacement of existing fauna.
- Loss of vegetation

4.10.2 Mitigation measures

- Renovation of ponds
- Construction of check dams and water holes; Engagement of fire watchers.
- Education and training etc.
- Logistic support in form of equipment, Vehicles etc as required by the implementing DFO will be extended.

The objectives of the green belt cover will cover the following

- Noise abatement

- Reuse of waste water to the extent possible
- Prevention of soil erosion
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantation covers.
- Green belt around mine, dumps, etc:
 - Tall growing, closely spaced, evergreen trees native to the area
 - Easy, quick early growth and establishment
 - Uniform spreading of crown habit.
 - Timber trees having long gestation period.
 - Trees with high foliage density, leaves with larger leaf area
 - Attractive appearance with both good flowering and fruit bearing.
 - Bird and insect attracting species
 - Suitable green cover with minimal maintenance
- Avenue Trees:
 - Trees with conical canopy and with attractive flowering
 - Trees with medium spreading branches to avoid obstruction to the traffic
 - Trees with branching at 10 feet and above.

4.10.3 Conservation Plan for Indian Peafowl (Peacock)

An Indian Peafowl or Peacock (*Pavo Cristatus*) is a large pheasant justifiably declared as the National Bird of India in 1963 due to its flagship value founded on its glorious position in mythology and its widespread distribution and grandeur. In India, it is given the utmost protection by inclusion in Schedule 1 of Indian Wildlife Act, 1972 (2002). Being a wide spread species, apart from the various urban habitats, it is also found in agriculture field, along stream with good vegetation and close to human habitation in semi – feral conditions. In the present study area this species have been confirmed from various habitats located near the village periphery.

Table 4-18 Conservation Plan for Peacock for five years conservation Plan

S.No	Work or Activity	1 to 5 years	Location
1.	Plantation	100 trees per year plant of local plant species for five years in villages.	Villages covered in 10 km study area
2.	Water filling	5 number in water hole filing during summer.	Ponds covered in 10 km study area
3.	Awareness	In school of nea/rby villages for peacock conservation as Drawing Competition. (Peacock Picture) & Essay Writing on Peacock.	Villages covered in 5 km study area

****All above activity will be carried out with the consultation of Ecologist**

Plant Species will be suggested by the Ecologist and plant saplings will be distributed in project villages as per the above mentioned schedule (year wise).

4.11 Green Belt Development

The green belt plantation programme will be continued till the end of the mining operation in the area. In framing out this programme on a sustainable and scientific base, due consultation and coordination with the forest department will be sought.

Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action. The existing plantation will be developed inside the mining lease is about 0.12.5ha, out of 16.54.0 ha.

The soil dumps, are planted to prevent erosion and for stabilization of the soil. Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

4.12 Impacts on Occupational Health Due to Project Operations

Anticipated occupational illness sequel to mining activities involved in the project as follows

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration

4.12.1 Mitigate Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation
- Avoid blasting during unfavorable wind & atmospheric conditions
- Use of personal protective equipment. Compliance with DGMS circulars
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
- All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
- On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

Table 4-19 Mitigation for occupational health and safety

S. No	Activity	Mitigation measures

1	Excavation	Planned excavation, avoid haphazard mining
2	Drilling and blasting	<ul style="list-style-type: none"> ➤ Driller should be equipped with a closed cabin to reduce exposure to noise and dust. ➤ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
3	Safety zone	<ul style="list-style-type: none"> ➤ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➤ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.
4	Overburden stabilization	<ul style="list-style-type: none"> ➤ Accidents are known to happen due to overburden collapse. ➤ Therefore, slope stabilization and dump stability are critical issues for safety and environment.
5	Worker's health surveillance	<ul style="list-style-type: none"> ➤ Health survey programmes for workers and local community. ➤ Regular training and awareness of employees to be conducted to meet health and safety objectives.

4.12.2 Mitigate Measures for Safety Aspects

- To reduce pollution emanation from quarry operations carry out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation. Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4.13 Impacts on Social Environment

Since the entire release area of both the project has no habitations or hutments in the core zone area, no rehabilitation or resettlement problems are involved. By adopting various mitigation measures as explained earlier, the environmental scenario in respect of ambient air quality, water quality, Noise levels, water aspects, biological aspects etc. during the operation of the project will be maintained within the statutorily prescribed levels. As such, impact due to the projects will be positive on socio-economic aspects. It will be ensured that the buffer zone of the quarry will be properly preserved environmentally in all respects within sustainable limits through necessary monitoring. The project will be operated with due care for minimizing environmental impacts with

proper EMP measures for pollution control. indirectly scores of people will be benefited by gainful indirect employment opportunities through various service related activities connected with the project operations as shown under.

4.14 Corporate Environmental Responsibility

TAMIN Panchapalli&Namandahalli site had no Relocation and Rehabilitation. Most villages have benefitted mutually at Panchapalli&Namandahalli where the mining industry has provided indirect jobs for labor and villages provide accommodation for the labor and staff. Supportive industries like food supply and essential shops are economic growth in the villages. The site has provided road access to a few nearby village sites. CER Activity will be implemented as per MoEF&CC O.M dated 20th October, 2020 (F.No. 22-65/2017-IA.III):

Other benefits to Community

- Project related logistical operations.
- Various trading services for consumer goods, spare parts, sundry items, etc.
- Contractual services connected with the project.
- Green belt works in the project.
- Casual labor needs for various activities.

The project will provide ample opportunity to the local people for direct and in-direct employment. The proposed project may create opportunities for indirect employment in the field of vehicle hiring, labours, trading of construction materials, carpenters etc. The major areas which required immediate attention relates to infrastructure support, health & sanitation, Anganwadi services, school education, youth development, income generation activities & veterinary services.

5 ANALYSIS OF ALTERNATIVES

5.1 Alternate Technology

Semi mechanized opencast method is being involved in this Quarry.No alternative technology will be envisaged for this proposed enhancement project.

5.2 Method of mining

5.2.1 Opencast Method

Open cast, semi-mechanized mining with 6 m vertical bench with a bench width not less than bench height has been proposed. Under the regulation 106(2) (a) of the Metalliferous Mines Regulation 1961 in all open cast working in hard ore body, the benches and sides should be properly benched and sloped. The height of any bench shall not exceed 6m and the width thereof shall not be less than the height. The benches shall be sloped at an angle of more than 45° from the horizontal.

5.3 Alternate Site

The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise. The project site is located at S.F. No.287(Panchapalli)&19(Namadahalli), over an extent of 16.54.0 Ha, Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu. It is Government Poramboke land the applicant has obtained lease from the Government is enclosed as **Annexure - I.**

5.4 Connectivity

The nearest railway station is Rajakkottai railway station which is about 7.65km on NE. The project site is adjacent to the SH 85 i.e. Rayakottai - Mathigiri road approximately 6.94 km on NNE direction. The NH 844 Hosur - Dharmapuriroad is around 6.42 km in the E direction.

6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 General

The mitigation measures suggested in **Chapter 6** will be implemented so as to reduce the impact on the environment due to the operations of the project. The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various Central and State Pollution Control Board Limits. The various methodologies and frequency of studies of all environmental quality parameters also conform to norms laid down by MOEF, CPCB and SPCB in this respect.

The Project proponent of quarry will be overseeing/reviewing following activities:

- To observe the implementation of environmental control measures.
- To ensure implementation of planned plantation programme with monitoring of survival rate, etc.
- To keep monitoring records properly for submission of periodical returns to statutory authorities and for checking by them.
- To evaluate periodically the performance of existing pollution control equipment and systems for taking prompt action in this respect to rectify the defects.
- Conducting safety audits and programmes to create safety awareness in workers/staff.
- Monitoring of dumps and benches for slope stability, monitoring of OB dumps, laying of check dams, garland drains around the dumps and excavated areas and their regular maintenance for de-silting.
- To study the effects of project activities on the environment.
- To interact and liaise with State and Central Government Departments.
- To take immediate preventive action in case of some unforeseen environmental pollution attributable to the project.
- Imparting training on safety and conduct safety drills to educate employees.
- To ensure that firefighting equipment, etc, are kept in ready-to-use condition.

For each of the environmental attributes, the monitoring plan specifies the parameters to be monitored, location of monitoring sites, frequency and duration of monitoring and it also denotes the applicable standards, implementation and supervising responsibilities.

6.2 Monitoring Schedules for Various Environmental Parameters

The proponent shall adopt the following monitoring schedule for environmental parameters. However, based on the need and priority it may be suitably modified / improved. However, since the proponents are different, monitoring, fulfilling of all the statutory obligations and maintaining records are to be carried out separately by the proponents.

6.2.1 Ambient Air Quality

The following monitoring schedule is given for ambient air quality.

➤ **Parameters**

Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x), Suspended Particulate Matter (SPM), Respirable Particulate Matter (PM- 2.5/10).

➤ **Frequency of Monitoring**

Once in a year in each location.

➤ **Location**

2 or 3 locations in buffer zone and 1 location in work zone. The environmental standards for Ambient air quality prescribed by CPCB/MOEF/SPCB.

6.2.2 Water Environment

Water quality monitoring at least before and after monsoon from ground water near the lease area and mine pit water sample shall be monitored. General, Physical and chemical parameters, COD, BOD, TSS etc shall be analyzed.

6.2.3 Noise Measurement

Work Zone noise and Ambient Noise level shall be monitored at least once in a year. Noise monitoring at ambient air monitoring locations will be carried out. Besides, vibration studies in the nearby villages shall be carried out, as per necessity and direction of DGMS, etc. The noise level standards as given by CPCB / MOEF given in **Table 6-1** will be enforced in the mine.

Table 6-1 Environment (Protection) Rules 1986

S. No	Area Code	Category of area	Limits in dB(A) Leg	
			Day Time	Night Time
1	A	Industrial area	75	70
2	B	Commercial area	65	55
3	C	Residential area	55	45
4	D	Silence Zone	50	40

Note:

- Day time shall mean from 6 a.m. and 10.0 p.m.
- Night time shall mean from 10.0 p.m. and 6 a.m.
- Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.

- Mixed categories of areas may be average as one of the four above mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is energy mean of the noise level over a specified period.

6.3 Post Project Environmental Monitoring

It is imperative that the Project Authorities set up regular monitoring stations to assess the quality of the neighboring environment of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Identify the effectiveness of mitigate measures suggested in the EMP.

Table 6-2 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1.	Meteorology	One	Hourly and Daily basis.	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2.	Ambient Air Quality	2 Stations (In downwind)	Twice a week:24 hourly period	PM ₁₀ , PM _{2.5} , SO ₂ , VOC and NO ₂
3.	Noise	2 (two within plant premises and two outside plant premises)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM ₁₀ , PM _{2.5} , SO ₂ & CO
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Solid waste / Hazardous waste	Check conformance to HWM rules	Quantity and Quality monitoring	Physical state, Paint Filter Liquid test (PFLT), Loss On Drying (LOD), Loss On Ignition & Calorific Value.
7	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties, Nutrients, Heavy metals
8	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants

9	Surface/ Ground water quality	Two Locations Within Project Site	Yearly Once	As per ISO 10500 Standard parameters
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6.3.1 Occupational Health and Safety

- Occupational health survey of staff and permanent workers will be undertaken at least once in 3 years to detect early incidence of diseases and for prompt remedial medical follow up in the matter. Audiometric test for the workers will be done at regular interval for workers of the noise prone area. Safety matters also will be reviewed periodically by safety in-charge.
- Occupational health and safety is very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mines are fugitive dust and noise. Safety of employees during blasting operation and maintenance of mining equipment and handling of explosive materials is to be taken care of as per the Mine Regulations, 1961 and Circulars of DGMS. To avoid any adverse effects on the health of workers due to dust, heat, noise and vibration, sufficient measures have been proposed in the EMP. These include
 - Provision of wet drilling /or dust collectors
 - Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets etc.
 - Provision of personnel protection devices for the workers
 - Rotation of workers exposed to high noise areas
 - Closed control room in crusher house with proper ventilation
 - First-aid facilities

Occupational Health Survey of the employees will be carried out at regular intervals.

6.4 Environmental Monitoring Programme

Table 6-3 Environmental Management Plan

S. No	Salient Items	Proposals as per Scheme of Mining earlier	Position at the end of five years of Scheme of Mining period	Proposals for the next five years plan period
1	Top Soil storage preservation and utilization	The recovered interstitial soil from the mine will be used for Planting trees and growing	As proposed in the Scheme of Mining the top soil stored in the inter boundary of the lease area for plantation purposed	In the ensuing Scheme of Mining-II period also. Top soil will be stored plantation purpose and thus the afforestation programme complied with.

2	Land Reclamation	Proposed not to backfill the mine-pit, and will be left as its condition	As proposed in the Scheme of Mining, the mine pit is left its condition	The mine-pit will be utilized as a water reservoir (or) may be used for fish-culture purpose.
3	Waste Dump Management	Proposed to stack the waste in the inner boundary of the lease hold area all along the southern boundary of the field and may be used to grow	The waste has been dumped in the inner boundary as per the proposal	In the next five years period. The waste can be dumped over the existing waste dump in the southern portion of the lease area.
4	Afforestation Program with precautions for survival and protection of plantation.	Proposed to cover an afforestation 20 plants per year is proposed with the survival rate of 50%	As proposed 20 Plants were planted during the Modified Scheme Period-II along the southern boundary of lease area and achieved survival rate of 50 %	In the ensuing 5 years period of Scheme of Mining-III, 20 plants per year is proposed to be planted for complying the afforestation programme with an achieved survival rate of 50% in the south eastern portion of the lease area in
5	Quality of mine water and any interference with surface waters	The proposal for the confinement of waste dumps arranged to prevent the interference of surface water sources and thus the quality of mine water is good	Followed the Procedure as proposed in the Scheme of Mining period also.	Proposed the same procedure to be followed in the ensuing five years period of Scheme of Mining
6	Fly rock fragments And precautions	Proposed to follow up low explosives detonating cord can be used to avoid fly rock. Fly rock will be avoided by deploying diamond	Followed the muffle Blasting procedure and thus prevented the fly rock fragments. Fly rock avoided by diamond wire cutting method.	In the ensuing 5 years scheme of mining period, the same safety precautions will be followed. Fly rock will be avoided by deploying diamond wire cutting method.

7 ADDITIONAL STUDIES

7.1 Introduction

The additional studies involved in this project will consist of following aspects:

1. Public consultation
2. Quantification of Damage Assessment
3. Natural Resources, Ecological Damage & Remediation Plan and Cost
4. Natural & Community Resource Augmentation Plan
5. Community Resource Augmentation Plan breakup
6. Risk assessment / Disaster Management Plan
7. Mine closure plan
8. Occupational Health and safety studies have been conducted and a safety plan was prepared.

7.2 Public Consultation

The proposed project is categorized as 'B1' category Schedule 1(a) as per EIA Notification 2006 and its amendments there after. The total area of the quarry is 16.54.0 Ha.

However, the proposed project falls under 'B1' category, Schedule 1(a), Public Hearing is Mandatory. So, EIA report has been prepared as per the obtained ToR vide Lr No.SEIAA-TN/F.No.6709/SEAC/1(a)/ToR-1339/2022, dated:16.02.2023. Draft EIA report was submitted for Public Hearing (PH) to Dharmapuri PCB. After PH, the minutes obtained will be incorporated in the EIA report along with action plan by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

After PH, the minutes were incorporated in the EIA report along with action plan or commitment by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

7.3 Risk Identification & Management

7.3.1 Introduction

Mining and allied activities are associated with several potential hazards both to the employees and the public at large. A worker in a mine should be able to work under conditions that are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency. The various safeguards to be taken to ensure the safety of the mine and that of employees are provided in the Mines Act, 1952. Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas.
- Identification of representative failure cases.
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion.
- Assess the overall damage potential of the identified hazardous events and their impact zones from the accidental scenarios
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view
- Furnish specific recommendations on the minimization of the worst accident possibilities.
- Preparation of broad DMP, On-site and Off-site Emergency Plan.
- Occupational Health and Safety Plan.

The complete mining will be carried out under the management control and direction of a qualified mine manager holding a first class manager's certificate of competency. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:

- Accident due to explosives
- Accident due to heavy mining equipment; and
- In order to take care of above hazard/disasters, the following control measures will be adopted.
- All safety precautions and provisions of the Mine Act, 1952, the MMR 1961 and the Mines Rules, 1955 will be strictly followed during all mining operations
- Entry of unauthorized persons will be prohibited
- Firefighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use
- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines will have to undergo the training at a regular interval
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done
- Handling of explosives, charging and blasting will be carried out by competent persons only.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Suppression of dust on the haulage roads
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
- For any type of above disaster, a rescue team will be formed by training the mining staff with specialized training.

7.3.2 Identification of Hazards in Open Cast Mining

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Drilling
- Blasting
- Overburden handling
- Heavy Machinery

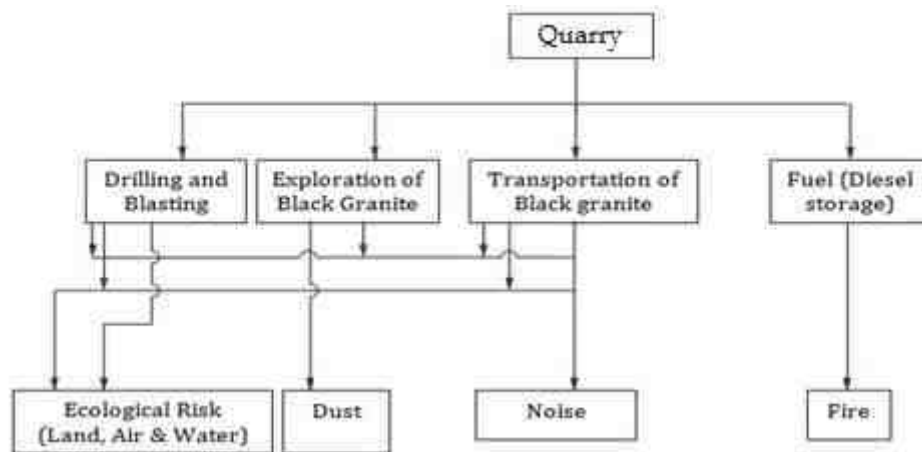


Figure 7-1 Identification of hazards in opencast mine

7.3.2.1 Drilling

Drilling is an important activity in mining. This activity releases particulate matter into the air and noise in the vicinity of the operation. The particulate matter/dust can be arrested by employing dust extractor, wet or dry type. The usage of standard drill bits also reduces the dust formation. The noise is also arrested by the usage of dust extractors. The compressors which feed the compressor air to the drilling jack hammers can be covered in acoustic enclosures which reduce the dust and noise. The hard strata will be excavated after drilling and blasting. Drilling will be done with jack hammers up to 1.2 to 1.5m depth having a diameter of 30-32 mm.

7.3.2.2 Blasting

Most of the accidents from blasting occur due to the projectiles, as they may sometimes go even beyond the danger zone, mainly due to overcharging of the shot-holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

- The damaging impacts on environment are evident noise, gas, and flyrock and ground vibration.

- The last factor is most important for safety of constructions, buildings and various natural objects in the vicinity of mining area.
- The ground vibration parameters, crucial for safety of endangered objects have a significant correlation with charge weight and distance of blasting.
- This study tried to associate the main vibration parameter, particle velocity with blasting parameters and properties of vibration medium.

7.3.2.3 Precautionary Measures to Avoid Accidents Due to Blasting

- The provisions laid down in the MMR 1961 related to Blasting shall strictly be followed. However, some of the main provisions are written here
- The Wire saw and crack powder will be utilized extensively to reduce the requirement for blasting.
- The blasting will be done under supervision of blaster/mine mate/mine foreman/mine manager
- Shots shall not be fired except during the hours of daylight.
- The holes charged on any particular day shall be fired on the same day.
- Adequate blasting shelters or other protection shall be provided at mines.
- The shot-firer shall give sufficient warning by effective signals over the entire area falling within a radius of danger zone.
- Multi-shot exploder shall be used. A shot-firer will fire maximum 120 Shots.
- During the approach and progress of electrical storm, adequate precautions shall be taken.

7.3.2.4 Overburden Handling

No overburden will be generated in the proposed project and side burden dump may cause landslides. High side burden dump created at the quarry edge may cause sliding of the side burden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property.

7.3.2.5 Heavy Machinery

Most of the accidents during transport of dumpers, trucks, proclain, ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

7.3.2.6 Precautionary Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working shall be carried out directly under the supervision and control of the management.
- The vehicles must be maintained in good conditions and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.

- Road signs shall be provided at each and every turning point especially for the guidance of the drivers.
- To avoid danger while reversing of vehicles especially at the embankment and tipping points, all areas for reversing of lorries should as far as possible be made man free. A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.
- Generally, oversize rocks shall be dealt with in the pit by secondary blasting.
- A Load consisting of large rocks must not be over the edge. This is unsafe and may damage equipment.
- The movement of the dumpers will be governed under the Code of Traffic rule, this is already formulated & implemented.

7.3.2.7 Storage of Explosives

The explosive requirement of the quarry operation is minimal. The blasting requirement will be carried out using contractors approved by the Controller of Explosives. No Explosive storage is envisaged in this quarry.

7.3.2.8 Safety Measures at the quarry

- Adequate care has been taken in deciding the size of the bench for the working pit.
- The benches are properly sloped at an angle of 60 degree to avoid any spillage of benches.
- Adequate drainage system at the top of the pit and also on the benches shall be made to prevent erosion of the benches.
- The quarries will be protected by garland drains around the periphery for storm water drainage.

7.3.3 Disaster Management Plan

The disaster management plans aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the disaster management plan, it should be widely circulated and personnel training through rehearsals/drills. The objectives of the disaster management plan is to make use of the combined resources of the mining operation and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties
- Safeguard other people
- Minimize damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify any dead

- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency
- In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

Emergency Organization (EO)

It is recommended to setup an emergency organization. A senior executive (Mine Manager) who has control over the affairs of the mine would be heading the emergency organization. He would be designated as site controller. As per the general organization chart, in the mines, the Mines Foreman would be designated as the Incident Controller (IC). The incident controller would be reporting to the site controller. Emergency coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services.

Emergency Communication (EC)

Whoever notices an emergency situation such as fire, growth of fire etc. would inform the Mines Foreman. The Mines Foreman would appraise the site controller. Site Controller verifies the situation from the incident controller takes a decision about an impending on site emergency. Simultaneously, the emergency warning system would be activated on the instructions of the site controller.

In order to handle disaster/emergency situations, the following personnel shall deal with the disaster/Emergency

- Mines Manager-site controller
- Mines Forman-incident controller
- Mine mate –Fire controller
- Senior most Driver-Transport coordinator
- Senior most operator- Medical coordinator

7.3.3.1 Emergency Services

This includes the fire-fighting system, first aid center, etc. Alternate sources of power supply for operating fire pumps, communication with local bodies, fire brigade etc. will also be clearly identified. Adequate number of external and internal telephone connections shall be installed.

1. Fire Protection System
2. Off Site Emergency Plan

7.3.3.2 Fire Protection System

The fire protection system for the project maintained will consist of Portable hand appliances of suitable types/capacities for extinguishing small fires in selected mine areas, storages areas such as that of Diesel, Explosives, etc.

7.3.3.3 Off-Site Emergency Plan

The offsite emergency plan defining the various steps to tackle any offsite emergencies, which may affect surrounding areas of the project, has to be prepared after due finalizing discussion in this respect with local Panchayat official, Revenue officials and District Collector. As per this off site plan, in case of any off site emergencies, actions have to be promptly initiated to deal with the situation in consultation with Collector and other revenue officials.

7.3.4 Mine Closure Plan

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and also in the form of waste dumps. As per the petro genetic character, the depth persistence of the black granite body in the area is beyond the workable limits. However, it is very difficult to operate granite dimensional stone mine economically below a depth of 40m by observing the statutory of mine safety rules and regulations. Hence in the proposed mining plan, only 40m depth has been envisaged as 'Workable depth' for safe and economic mining.

However, it is proposed not to back fill the ultimate pit, in as much as quantity of reserves is available below the workable depth of 40m and there is possibility of technology up-gradation in granite mining for greater depths. The site boundaries shall be safely fenced and used as a reservoir after mining activities are over.

There is no proposal for back filling, reclamation and rehabilitation. The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle. There is no proposal for back filling, reclamation and re habitation

7.3.4.1 Progressive Mine Closure Plan

The various schedules for mining activities regarding mining of granite block, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the earlier chapters in this EIA/EMP report.

Concurrent planning for various steps to be adopted for final mine closure, along with regular working schedules and systems of the mine, will facilitate to effect smooth switchover to final mine closure stages ultimately.

7.3.4.2 Water Quality Management

The ground water quality in the region indicates neutral range with pH values. Most of the analytical results for ground and surface water showed parameter concentrations well within the permissible limits. Garland drains will be provided all along the periphery of the mining pit and along the toes of the side burden dumps. These drains will be aligned in such a way that all the surface drainage water will be carried away from the mining zone to settling tanks.

The mining pit's catchment water will be coursed to the main sump and used for dust suppression and green belt development & plantation activities.

7.3.4.3 Mines Seepage Water

The experience of mining during past three years suggests a very little, almost negligible seepage of water in the mining pit. It will be collected in a well guarded pond / sump for settling of solids. The treated water will be used for dust suppression on working faces, haul roads and dump surfaces.

7.3.4.4 Air Quality Management

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e., during Pre-Monsoon season (June-August 2018). PM10, PM2.5, SO2, NOx, Pb, NH3, C6H6, C20H12, As, Ni, were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location.

The following precautions have been considered for abatement of air pollution in the black granite mine area:

- Water sprinkling shall be carried out at the active working faces, on all haul-roads and the dump surfaces.
- Regular cleaning and removal of spillage black granite from haul roads and weighbridge areas.
- Proper and regular maintenance of mining equipments.
- Development of comprehensive green belt around overburden dumps to reduce fugitive dust emissions in order to create clean and healthy environment.

7.3.4.5 Solid waste Management

As is stated earlier, mining will be carried out by opencast semi-mechanized method using conventional mining equipments i.e., hydraulic excavators / shovels and dumpers combination with ancillary mining equipment like compressor, wire cutting machine, generator etc.

The mine waste in the mine includes the over lain unrecoverable boulders / rock fragments and rubbles generated as granite rejects during the production works and the waste fragments

generated during development works will be utilized for forming approach road and dumping yard purposes. Adequate space has been identified within the lease applied area for dumping such waste material on barren land covered with soil. The 7.5 m safety distance as well as the defective portion of the deposit may also be used for waste dumping purpose.

7.3.4.6 Stabilization of Dump

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However, suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

7.3.4.7 Mine Drainage

The lease applied area is hillock 100m height with slope towards southern sides. Through the area receives scanty rainfall, the ground water level is at 14m depth. The Production faces are operated at shallow depths. During the rainy seasons the surface run of water and the ground water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10HP oil engines.

7.3.4.8 Disposal of Waste

The Mine waste in the mine includes the over burden, side burden, rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation, formation of dumping yard sites etc., During the first five years of Mining Plan period, such waste material are proposed to be dumped along the Southern part of the lease area where it comprises of country rock terrain.

7.3.4.9 Top Soil Management

Topsoil will be properly stacked at earmarked dump site with adequate measures. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled area. The topsoil stockpiles will be low height and will be grassed to retain fertility. Besides these topsoil stacks there will be temporary stacks near the excavation area and area to be reclaimed which will be made use of for concurrent lying without bringing the topsoil to the soil stack near the OB dump.

7.3.4.10 Disposal of Mining Machinery

Mining operations are planned to be operated using Company owned machinery. The company has its own Excavators, Mining Tippers, compressors; wire saw machine, jack hammers, and other mining equipment. These machines are complaint to the RTO conditions and CPCB conditions. Further, the company also operates a central workshop at Salem, to cater to major repairs/Rectifications of company Equipment.

These machineries are written off and disposed on completion of their normal life as per the set guidelines of the Government and TAMIN Board. The surplus machinery in working order, will be transferred to Company's other projects.

7.3.4.11 Other Infrastructure

Mine office, store room, first-aid room etc, will be provided on semi-permanent structures within the lease applied area.

7.3.4.12 Safety & Security

The water ponds developed in the reclaimed areas shall be properly fenced for safety. The water from these ponds is likely to be potable and shall be used for human & cattle consumption and for agriculture purposes.

7.3.5 Social Impact Assessment R & R Action plan

There will be no Rehabilitation and Resettlement in this proposed project.

8 PROJECT BENEFITS

- The quarrying activities in this belt will benefit to the local people both directly 30and indirectly 20 persons.
- The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers.
- Improvement in Per Capita Income.
- The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.
- It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses.

9 ENVIRONMENTAL COST & BENEFIT ANALYSIS

(Not recommended during scoping)

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Environmental Management Plan

Environmental Management Plan covers the genesis of pollution, the principal sources of pollution, the nature of pollution, the proposed measures required for meeting the prevailing statutory requirements of air emissions, waste water discharge characteristics, noise levels, land use, socio economics etc for environmental management purpose in connection with the mining and quarrying related activities in the study area.

10.2 Emission Source Identification

The Emission sources are activities related to pits and quarries including, overburden operations, boring, drilling, conveying, washing, drying, hauling, loading and unloading stockpiles. The emission sources may be subdivided into six broad categories:

- Emissions of PM and road dust due to HEMM & Mining Tippers.
- Emissions from generators.

10.3 Air Quality Management

Quarrying operations are semi mechanized to mechanized, but there is involvement of labours too. Dust would be generated during the course of over burden removing, drilling, mining, hauling, handling and transportation of the material. Dust is likely to be generated from emissions of diesel vehicles such as SO₂, NO_x etc.

10.3.1 Measures for dust suppression

Water will be sprinkled for suppression of air borne dust on mine haulage roads and waste dumps on regular intervals by water tankers. Drilling of blast holes of 32 mm dia will be always under wet condition to prevent flying of dust. In the unloading point of Tippers, water will be sprinkled and further the drillers are provided with respirators in accordance with mines regulations.

10.3.2 Emissions from Material Handling

PM emissions occur during the handling and transfer operations of material from one process to another within the facility. Open storage piles of raw material and products are generated at various points throughout the operational area.

The environmental control measures, which are being taken and proposed to control the fugitive dust released during the stone quarry production are given below:

- The working faces will be regularly wetted before carrying out the drilling and excavation.
- Dust masks will be provided to the workers especially for the drillers and for the workers working in the loading operations.
- Periodic health check up for the workers shall be done
- Plantation along approach roads and surrounding the Quarry Lease area.
- Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression.

Haulage

- Haul road will be maintained regularly.
- Speed limits will be prescribed for transport vehicles.
- Water will be sprayed daily on the roads by using water tankers.
- Periodic maintenance of the trucks used for transport shall be done to reduce smoke emissions.
- Over loading of trucks is avoided.

10.4 Noise Pollution Control

In an operational mine major noise sources are operation of mine machineries, equipment & plying vehicles. Noise generation may be for an instant, intermittent or continuous periods, with low to high decibels. General noise levels generated at mines are documented as below

Equipment	Noise Level (dB (A))
Rotary Drills	72-100
Compressor (85 m ³ /min)	50-55
Rock buggy machine	110-115
Excavator	75-90
Diesel Tipper	74-109
Diesel Generator	80-94

The management plan for controlling noise pollution is as given below.

- Reducing the drilling operations as far as possible
- Provision of earmuffs to workers working in high noise prone areas.
- Proper gradient of haul roads to reduce cumulative noise levels.
- Development of green belt all along the boundary of the mining lease area which will act as effective noise barrier.
- Use of Diamond Wire Saw machine to reduce noise.
- Restriction of blast hole drilling to only day time hours and usage of sharp drilling bits and delivery of compressed air at optimal pressure during drilling.

- Noise emanating machine such as compressors, diesel generator are enclosed in acoustic enclosure so as to reduce the noise level.

10.5 Water Pollution Control Measures

10.5.1 Surface Water

There are no major streams and rivers, which can get effected by the mining. Hence there will be no major effect on the surface water environment.

Surface water ditches or channels will be made to divert all surface drainage for agricultural purposes.

10.5.2 Mine Drainage Water

During the five years sheet rock will be mined. During this period of the lease, quarrying will go to the depth of 30 meters below ground level including 12m thick overburden from the present level. Mine water will be used in mechanized cutting of the blocks and for wetting purpose. The runoff from the dumps will be channelized and care will be taken.

- Mine water will be used in wet drilling process, dust suppression & green belt development
- The runoff from the dumps will be channelized and care will be taken.

10.6 Land Environment

Landscape will be slightly changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will not be effected, as the quarry is located in plain terrain. Soil cover and the weathered material accounts for the Over Burden. Agriculture is seen mainly in the plains far away from the lease area. A few bushes will be cleared to facilitate mining and other related activities and there are no big trees.

- Top soil shall be used in afforestation work, as early as possible.
- A retaining wall and garland drain will be constructed all around to prevent the wash off. Landscape will be changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will be effected.
- Soil cover and the weathered material accounts for the Over Burden
- Top soil will be removed & stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.

10.6.1 Top soil management

Top soil will be removed in advance and stacked separately. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks. Top soil shall be used in

afforestation work, as early as possible. A retaining wall and garland drain will be constructed all around to prevent the wash off.

10.7 Solid Waste Management

The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to their quality and size. Irregular large size rocks of different size will be cut. The remaining waste material will be dumped at separate lease area acquired by applicant at outside the quarry lease area. This waste rock pieces will be used as road metal or building material. All the care will be taken to minimize the waste generation at the source.

- The overburden is dumped inside the mining area to stabilize slopes and reclaim low lying areas within the mine. Top Soil recovered will be used in the green belt areas on the Southern side of the lease area.
- Top Soil recovered will be used in the green belt areas on the boundary of the mine site.
- Top soil will be removed & Stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.
- The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to the mining plan.
- All the care will be taken to minimize the waste generation at the source.

10.8 Stabilization of Dumps

The dumps are mainly constituted of quarry waste with soil. It will be afforested properly to stabilize the dumps and preserve soil character. Further ends will be properly subjected to vegetation by growing some bushes and shrubs. Garland canal also will be dug around the dump.

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

10.8.1 Measures to be adopted for Solid Wastes Management

From the waste generated if any are separated and kept at the dump site. It is supplied to crushing plants and is used as road metal. The left out waste will be used for back filling the quarry which will be covered with soil added with soil conditioners and quarry will be reforested.

10.9 Biological Environment

As in any typical Ligneous rocks deposit, there is no tree growth on the area, but grass shrub and bushes grow sparsely. No wildlife is found in quarry Lease area. In order to minimize the impacts and to improve up on the existing eco system afforestation plan will be envisaged.

- As in any typical intrusive igneous rocks deposit, there is no tree growth on the area, but grass shrub and bushes grow sparsely.
- In order to minimize the impacts and to improve up on the existing eco system afforestation plan will be envisaged.
- No wildlife is found in quarry Lease area.

10.10 Granite Conservation and Development

The mining plan proposed has fully covered the aspects of granite conservation with a future plan to extend the proposed working of the mine to the full depth of the deposit. Extreme care is being taken to ensure proper supervision of quality control of the granite dimensional stone aimed at the recovery of the maximum saleable quantity / quality of granite dimensional stones suitable for full utilization of the consumers

10.11 Afforestation Plan

The main aim of the plantation of the mined out areas is to stabilize the area to protect it from rain, wind erosion, improve the aesthetics and support the re-creation of bio-diversity. For this purpose mined out area will be reclaimed by backfilling and afforested at post mining stage.

- Afforestation will be taken up along the lease area.
- In the Scheme of Mining 30 plants per year is proposed to be planted for complying Afforestation program with the arrived survival rate of 50% in the south eastern portion of the lease area in the phased manner.
- Only Shrubs and bushes are seen in the quarry Lease area.

10.12 Occupational Health & Safety Measures

Granite stonedoes not contain any toxic elements. Further this being a mechanized mine, production is by mechanized means and waste material handling partly by mechanized way, there shall be marginal impact on air and noise qualities. Therefore, the possibilities of any health hazards are minimal.

- Awareness and planning are keys to prevention of occupational health hazards.
- Conducting air monitoring to measure worker exposures and to ensure that provided controls are adequate for protection of workers.
- Adequate respiratory protection will be provided to the workers.
- Periodic medical examinations for all workers.

- Provide workers with training that includes information about health effects, work practices, and use of protective equipments.

10.13 Socio-Economic Benefits

Granite Quarry project is not going to have any negative impact on the social or cultural life of the villagers in the near vicinity. The quarry activity will provide job opportunities, which will help them to develop economically.

Granite quarry will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees will be provided.

10.13.1 Employment potential

Around 30 people directly and 20 people indirectly employed including material suppliers, outside workshops, unit supported industries. Local villagers residing in the nearby villages shall be employed as semi-skilled workers.

10.13.2 Care and Maintenance during Temporary Discontinuance

All the provisions as per the Mines Act 1952 and Rule17 of GC & DR 1999 shall be strictly adhered during temporary discontinuation.

10.13.3 Safety and Security

At the end of quarry operations, the total area excavated will be fenced properly with single opening for workers engaged in closure plan work.

10.14 Budget for Environmental Protection

It is necessary to include the environmental cost as a part of the budgetary cost component. Total of Rs 2,05,000/- allocated for environmental protection activities. Environmental Management cost is given in **Table 10-1**.

Table 10-1 Environmental Monitoring Cost

S. No	Details	Cost in Rs.
1	Afforestation	30,000
2	Water Sprinkling	50,000
3	Water Quality Test	25,000
4	Air Quality Test	25,000
5	Noise/Vibration Test	25,000
6	CSR Activities	50,000

Total	2, 05,000
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10.15 Environment Policy of TAMIN

M/s. Tamil Nadu Minerals Ltd, believes that good safety, Health & Pollution control practices contribute to individual well-being and organization morale. Our commitment to Safety, Health and Environment stretch beyond statutory obligations and we are committed to manage and continually improve the overall safety, Health and Environmental performance.

We M/s Tamil Nadu Minerals Ltd are committed to ensure that:

- We develop safe working methods and practices, with as objective of no injuries and accidents at the work place and provide a safe work place for our employees, contractors and other who perform their duties. We shall provide adequate Health care to our employees, and create processes to reduce the adverse effect of the operations on the health of the employees.
- We provide safety appliances and continuous training in safety to our employees and contract workmen to ensure safe production and achieve the target of zero accidents. We are committed to supporting actions aimed at increase in employees' safety outside work hours.
- We protect the environment by control and prevention of pollution and promote green environment.
- We continuously evaluate and improve our conduct and carryout regular audit, analysis and studies to eliminate potential concerns and continuously improve upon our Safety, Health and Environmental standards.
- We communicate our Safety, Health and Environmental Policy to all our employees' contractors and to the public for better understanding and practice.
- Management has knowledge of relevant issues regarding Safety, Health and Environment and provides a foundation for setting objectives and targets. Management shall fulfill its responsibility to inform, educate and motivate employees and others to understand and comply with this policy and applicable laws.
- M/s. Tamil Nadu Minerals Ltd shall use its resources in order to live up to this policy and thereby promote our business.

Besides, the company has formulated well-planned and integrated Environmental policies as shown below:

M/s Tamil Nadu Minerals Ltd is committed to welfare and development needs of the society around it.

- All rules and conditions prescribed in the Indian Mines Act, Metalliferous Mines Regulation etc., will be adopted to ensure risks-free and safe mining operations. All personal protective devices supplied to workers and staff should be used while they work in the mines.
- Any infringement/Mine Foremen /Mine Mate/ Blaster who will take immediate corrective measures for avoiding major disasters. The report will ultimately reach the Board of Directors through upwardly hierarchical communicative channels from the lowest level to superior levels in quick time bound duration.
- The Agent and the Mines Manager should exercise overall control over entire mining and connected operations and all infringements / on any count pertaining to unsafe operations, environmental degradation, etc.,
- The EC conditions and stipulations will be strictly followed by all supervisory staff of the mine, and will co-ordinate in various issues like prescribed environmental monitoring schedules, vibration monitoring studies during blasting, green belt development, management of dumps etc.
- A time schedule of once in 15 days for review of all operational factors as mentioned above is in force, for proper and quick corrective actions. Hierarchical System of the TAMIN is shown in **Figure 10-1**.

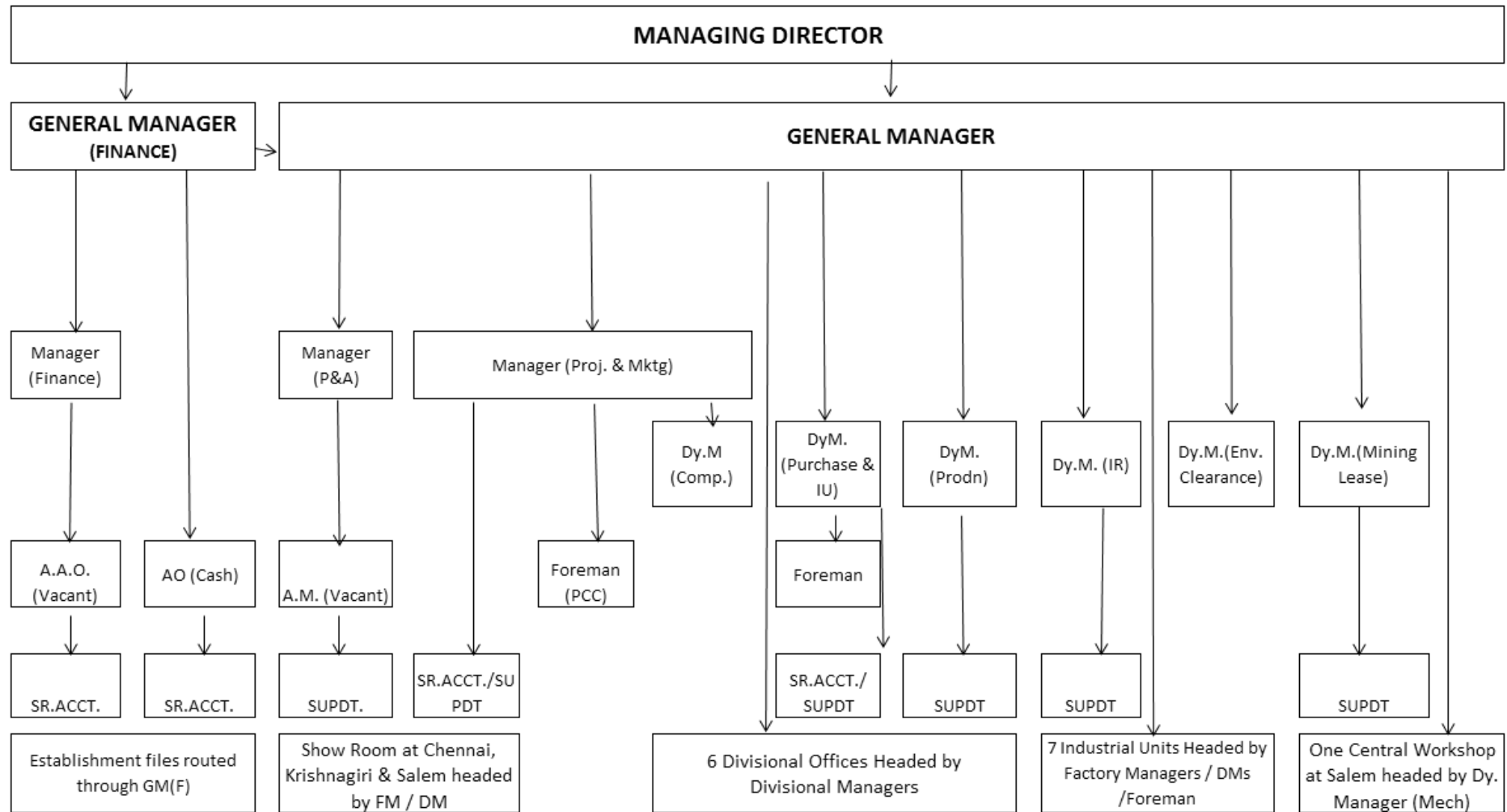


Figure 10-1 Hierarchical System of the TAMIN

11 SUMMARY & CONCLUSION

11.1 Background

The extent area of the quarry is 9.48.0 Ha at S.F. 287 (Panchapalli) over an extent of 7.06.0 Ha and at S.F.No.19 (Namandahalli) over an extent of 16.54.0 Ha. Lease has been obtained for total extent of **16.54.0 Ha** at Panchapalli&Namadahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu. TAMIN has been proposed to get a fresh lease for Black Granite (Dolerite)&Granitic Gneiss quarry over an extent of 16.54.0 Ha for 30 years lease vide TAMIN's G.O.(3D) No.52,Industries (MME-1) Department, dated: 11.11.2011.

The project falls under Schedule 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its Amendments thereafter and As per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' category. The ToR application was submitted under category B1, schedule 1(a).

The proposal was appraised during 347th SEAC meeting held on 13.01.2023 and ToR was issued vide Letter No. SEIAA-TN/F.No.6709/SEAC/1(a)ToR-1339/2022, dated: 16.02.2023 for the preparation of EIA/EMP report. EIA report will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

The proposed production capacity of the quarry during the mining plan period is 1,62,533m³ of Black Granite and 20,18,784 m³ of Granitic gneiss (Restricted as per ToR Issued) for five years. Mine lease area falls in the survey of India Topo sheet No. 57 L/2,3& 57H/14,15 and lies between the GPS coordinates of 12°28'33.38" N to 12°28'53.66" N and 77°57'32.69" E to 77°57'59.54" E.

11.2 Management Commitment

The company is assigning prime importance for environmental protection. TAMIN will be complied the environmental laws. M/s. Tamil Nadu Minerals limited will maintain well developed Greenbelt. Also all the environmental statutory requirements will be implemented and maintained continually.

11.3 Environmental Sensitive Areas

The detailed Environmental Sensitivity areas within the 15km radius of the project site are given in **Chapter 3, Section 3.4 and Table 3-1.**

11.4 Black Granite Quarry Reserves

- The estimated Geological Reserves of black granite based on the Geological cross sections was 7,95,808 m³ of black granite and 41,45,783 m³ of Granitic Gneiss (as per mining plan).

- The Mineable Reserves have been arrived as 6,16,994m³ of Black Granite and 28,66,968 m³ of Granitic Gneiss (as per mining plan).
- The Proposed production capacity is 1,62,533 m³ of Black Granite and 20,18,784m³ of Granitic Gneiss for five years.

11.5 Summary of the Magnitude of Operation

- The Black Granite quarrying operation is proposed to carried out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & 6m width. Major machinery is Compressor, Jack hammer, and excavator is used in proposed quarry. Tippers and dumpers will be used for transportation.
- The Proposed production capacity is 1,62,533 m³ of Black Granite and 20,18,784 m³ of Granitic Gneiss for five years.
- The mineable reserves have been computed as 6,16,994m³ of Black Granite and 20,18,784 m³ of Granitic Gneiss (as per mining plan).
- The effective geological reserves have been worked out as 7,95,808m³ of Black Granite and 28,66,968 m³ of Granitic Gneiss.

11.5.1 Land requirement:

The Black Granite and Granitic Gneiss mine is over an extent of 16.54.0 Ha. Lease area located at 287& 19, Panchapalli&Nmandahalli village, Palacode Taluk, Dharmapuri District, TamilNadu State, lies in the 12°28'33.38" N to 12°28'53.66" N and 77°57'32.69" E to 77°57'59.54" E.

- The lease area topography is plain terrain; elevation is 94 m (max) AMSL. The area is marked in the survey of India Topo sheet No. 57 L/2,3& 57H/14,15.

11.5.2 Water Requirement

- The total water requirement is 1.5 KLD (Drinking & Domestic purpose-0.5 KLD, Dust suppression -0.3 KLD, Wire saw cutting-0.3KLD & for Greenbelt-0.4KLD). The total water requirement will be met from Private tankers.
- The Black Granite and Granitic Gneiss quarry will not produce toxic effluent in the form of solid, liquid or gas.
- No wastewater will be discharged by quarry operation. Domestic waste water will be disposed to Septic Tank followed by soak pit.

11.5.3 Power & Fuel Requirement

- No power will be required during mining operations. Working will be restricted on day time only between 9AM to 5PM with 1PM to 2PM as lunch break.
- 1,54,340 liters of HSD for the entire project life will be brought from nearby diesel pumps.

11.5.4 Manpower

- Manpower requirement for the proposed project is 30 Nos.

11.5.5 Solid Waste Generation & Management

- Municipal solid waste (6.4 kg/day) will be segregated as Organic will dispse through local municipal bins and inorganic waste (9.6 kg/day) will be disposed through TNPCB authorized recyclers.
- Waste diesel Oil will be collected in leak proof containers and disposed to TNPCB Authorized Agencies for Reprocessing/Recycling.

11.5.6 Project Cost

- The total capital investment on the project is Rs. 99,97,000/- including EMP cost is 2,05,000/-

11.6 Baseline Study

Project Influence Area (PIA)/Study Area:

An area covering 10km radius from Panchapalli & Namandahalli Black Granite and Granitic Gneiss quarry boundary has been earmarked as study area for baseline studies.

Summary of Baseline Studies:

- Site has a plain terrain with level 45m Above MSL.
- The project site falls under Zone- II-III (Moderate Risk Zone) as per IS 1893 (Part- I).
- The predominant wind direction is South East during study period.
- Max Temperature: 34 °C Min Temperature: 14°C& Avg Temperature: 25.08 °C
- Average Relative Humidity: 52.51 %
- Average Wind Speed :3.12 m/s

Ambient Air Quality

Maximum concentrations of PM₁₀, PM_{2.5}, SO₂, NO₂, CO, Pb, O₃, NH₃, C₆H₆, C₂₀ H₁₂, As & Ni, are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period. The ambient air quality has been monitored at 8 locations for 12 parameters as per NAAQS, 2009 within the study area.

The average baseline levels of PM₁₀ is 32.69 to 51.34µg/m³, PM_{2.5} is 22.32 to 34.72µg/m³, SO₂ is 8.46 to 12.19 µg/m³, NO₂ is 20.52 to 28.68 µg/m³, all the parameters are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period from June to August 2021.

Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period. In Project site day time noise levels was about 59.2 dB(A) and 53.8 dB(A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).

In residential areas day time noise levels varied from 50.6 dB(A) to 54.1 dB(A) and night time noise levels varied from 40.2 dB(A) to 43.7 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels is within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Night time).

Water Environment

The prevailing status of water quality at 08 locations for surface water and 8 locations for ground water have been assessed during the study period. The standard methods prescribed in IS were followed for sample collection, preservation and analysis in the laboratory for various physio-chemical parameters.

Surface water quality

- pH ranges from 7.11 to 7.99.
- Total Dissolved Solids range from 431 mg/l to 617 mg/l.
- Total hardness ranges between 112 mg/l to 298 mg/l.
- The BOD value ranges from 6.1 mg/l to 10.5 mg/l.
- COD value 17.2 to 33.1 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se at all locations are within the limits of IS 2296:1992(Class-C: Drinking water with conventional treatment followed by disinfection.)

Ground Water Quality

- The average pH ranges from 6.72 and 8.26.
- TDS value varied from varied from 489mg/l – 825mg/l
- The chloride concentration ranged from 84.2 mg/l – 126.4 mg/l
- Total Hardness ranges from 167 to 391 mg/l within the permissible limit of the IS 10500: 2012.
- The sulphate content of the ground water of the study area is varied between 27.6 mg/l – 69.9 mg/l meeting the acceptable limit of the IS 10500: 2012.
- It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

Land Environment

Assessment of soil characteristics is of paramount importance since the vegetation growth, agricultural practices and production is directly related to the soil fertility and quality. Soil sampling was carried out at eight (08) locations in the study area.

It is observed that,

- The pH of the soil samples ranged from 6.54 to 7.96.
- Conductivity of the soil samples ranged from 101 to 197 μ mho/cm
- Nitrogen content ranged from 146.7 mg/kg to 257.8 mg/kg.
- Phosphorous ranged from 72.8 mg/kg to 130.6 mg/kg.
- Potassium content ranges from 37.9 mg/kg to 71.9 mg/kg.

Biological Environment

The floral diversity is grouped into trees, shrubs, climbers and herbs. Similarly, the faunal diversity is grouped into mammals, birds, reptiles and amphibians. There is no extinct flora and fauna species found in the study area.

Flora

It was observed that the flora, which includes herbs, shrubs and trees, were sparsely distributed within study area as per IUCN status Least concern, vulnerable species are observed within the study area. The detailed List of flora in the study area is given in **Chapter 3, Section 3.11.1 & Table 3-20.**

Sl.No.	Species	Family	Common Name	Habit	IUCN
1	Abrus precatorius	Fabaceae	Kundumani	Shrub	NA
2	Abutilon indicum	Malvaceae	Perunthuthi	Shrub	NA
3	Acacia nilotica	Mimosaceae	Karuvelam	Tree	LC
4	Acacia planifrons	Mimosaceae	Kodai velam	Tree	NA
5	Acalypha indica	Euphorbiaceae	Kuppaimeni	Herb	NA
6	Acanthospermum hispidum	Compositae	--	Herb	NA
7	Achyranthes aspera	Amaranthaceae	Nayurivi	Herb	NA
8	Aegle marmelos	Rutaceae	Vilvam	Tree	NA
9	Aervalanata	Amaranthaceae	Peelai, Sirupeelai	Shrub	NA
10	Aervapersica	Amaranthaceae	Perumpeelai	Shrub	NA
11	Aeschynomene americana	Fabaceae	--	Herb	NA
12	Aeschynomene aspera	Fabaceae	Thakkai	Shrub	NA
13	Ageratum conyzoides	Compositae	Poompillu	Herb	NA
14	Alloteropsis cimicina	Poaceae	--	Grass	NA
15	Alternanthera sessilis	Amaranthaceae	Ponnanganni	Herb	NA
16	Anisomeles indica	Labiatae	--	Herb	NA
17	Annona squamosa	Annonaceae	Seetha	Tree	NA
18	Arachis hypogaea	Fabaceae	Verkadalai	Herb	NA
19	Argemone mexicana	Papaveraceae	Braman Thandu	Herb	NA
20	Aristida adscensionis	Poaceae	--	Grass	NA
21	Aristida hystrix	Poaceae	--	Grass	NA

22	Aristolochiabracteolata	Aristolochiaceae	Aduthinnappalai	Herb	NA
23	Barleriaacuminata	Acanthaceae	--	Shrub	NA
24	Barlerialongiflora	Acanthaceae	--	Shrub	NA
25	Barlerianoctiflora	Acanthaceae	--	Shrub	NA
26	Boerhaviadiffusa	Nyctaginaceae	Mookarattai	Herb	NA
27	Boerhaviaerecta	Nyctaginaceae	Seemaimookarattai	Herb	NA
28	Carica papaya	Caricaceae	Pappali	Tree	NA
29	Carissa carandas	Apocynaceae	Kalaa, Perunkala	Shrub	NA
30	Cassia fistula	Caesalpinaceae	Kondrai	Tree	NA
31	Celosia argentea	Amaranthaceae	Pannaikeerai	Herb	NA
32	Cissus quadrangularis	Vitaceae	Pirandai	Shrub	NA
33	Citrulluscolocynthis	Cucurbitaceae	Peikkumatti	Herb	NA
34	Citrus aurantifolia	Rutaceae	Elumichai	Tree	NA
35	Cleome viscosa	Capparidaceae	Naikadugu	Herb	NA
36	Cocciniagrandis	Cucurbitaceae	Kovai	Climber	NA
37	Croton bonplandianum	Euphorbiaceae	Rail poondu	Herb	NA
38	Cucumis sativus	Cucurbitaceae	Vellarikkaai	Climber	NA
39	Cyperusbulbosus	Cyperaceae	--	Sedge	NA
40	Ecliptaprostrata	Compositae	Karisaalai	Herb	NA
41	Eleocharisacutangula	Cyperaceae		Sedge	NA
42	Eragrostistenella	Poaceae		Grass	NA
43	Euphorbia antiquorum	Euphorbiaceae	Sadura-kalli	Tree	NA
44	Euphorbia hirta	Euphorbiaceae	Ammanpacharisi	Herb	NA
45	Euphorbia indica	Euphorbiaceae	Ammanpacharisi	Herb	NA
46	Evolvulusalsinoides	Convolvulaceae	Vishnukarandi	Herb	NA
47	Ficus benghalensis	Moraceae	Aalamaram	Tree	NA
48	Ficus religiosa	Moraceae	Arasu	Tree	NA
49	Fimbristylisovata	Cyperaceae		Sedge	NA
50	Glinuslotoides	Molluginaceae	Siruseruppadai	Herb	NA
51	Gynandropsisgynandra	Capparidaceae	Nalvaelai, Vaelai	Herb	NA
52	Hedyotisaspera	Rubiaceae		Herb	NA
53	Heliotropiumindicum	Boraginaceae	Thaelkodukku	Herb	NA
54	Hibiscus surattensis	Malvaceae		Undershrub	NA
55	Hybanthusenneaspermus	Violaceae	Orilaithamarai	Herb	NA
56	Hygrophilaschulli	Acanthaceae	Neermulli	Herb	NA
57	Hyptissuaveolens	Labiatae		Shrub	NA
58	Indigoferaaspalathoides	Fabaceae	Sivanaarvaambu	Herb	NA
59	Indigoferalinnaei	Fabaceae		Herb	NA
60	Indigofera tinctoria	Fabaceae	Avuri, Neeli	Herb	NA
61	Ipomoea pes-caprae	Convolvulaceae	Attukkal, KudhiraiKulambu	Creeper	NA
62	Jasminumsambac	Oleaceae	Malli, Peru malli, Pichigai	Climbing Shrub	NA
63	Jatropha curcas	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
64	Jatrophagossypifolia	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
65	Justiciaadhatoda	Acanthaceae	Adathodai	Shrub	NA

66	<i>Justicia simplex</i>	Acanthaceae		Herb	NA
67	<i>Kylingabulbosa</i>	Cyperaceae		Sedge	NA
68	<i>Lagenaria siceraria</i>	Cucurbitaceae	Surakkaai	Climber	NA
69	<i>Lantana camara</i>	Verbenaceae	Unnichedi	Shrub	NA
70	<i>Leucaenaleucocephala</i>	Mimosaceae	Soundil	Tree	NA
71	<i>Leucas aspera</i>	Labiatae	Thumbai	Herb	NA
72	<i>Ludwigia perennis</i>	Onagraceae		Herb	NA
73	<i>Martynia annua</i>	Martyniaceae	ThaelKodukku	Herb	NA
74	<i>Melia azedarach</i>	Meliaceae	Malaivaambu	Tree	NA
75	<i>Merremia hederacea</i>	Convolvulaceae		Herb	NA
76	<i>Nyctanthes arbor-tristis</i>	Nyctanthaceae	Parijaatham	Tree	NA
77	<i>Ocimum americanum</i>	Labiatae	Ganjaankorai	Herb	NA
78	<i>Pavonia odorata</i>	Malvaceae	Peramutti	Herb	NA
79	<i>Pedaliium murex</i>	Pedaliaceae	Perunerunji	Herb	NA
80	<i>Phyllanthus acidus</i>	Euphorbiaceae	Aranelli	Tree	NA
81	<i>Phyllanthus amarus</i>	Euphorbiaceae	Kizha-nelli	Herb	NA
82	<i>Phyllanthus emblica</i>	Euphorbiaceae	Nelli, Muzhunelli	Tree	NA
83	<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Inkipazham	Shrub	NA
84	<i>Pithecellobium dulce</i>	Mimosaceae	Kodukkaipuli	Tree	NA
85	<i>Plumbago zeylanica</i>	Plumbaginaceae	Chitthiragam	Herb	NA
86	<i>Polygala javana</i>	Polygalaceae		Shrub	NA
87	<i>Pongamia pinnata</i>	Fabaceae	Pungamaram	Tree	NA
88	<i>Portulaca oleracea</i>	Portulacaceae	Kari keerai	Herb	NA
89	<i>Prosopis juliflora</i>	Mimosaceae	Velikkaathan	Tree	NA
90	<i>Psidium guajava</i>	Myrtaceae	Koyya	Tree	NA
91	<i>Punica granatum</i>	Punicaceae	Madhulai	Shrub	NA
92	<i>Rhynchosia viscosa</i>	Fabaceae		Climber	NA
93	<i>Ricinus communis</i>	Euphorbiaceae	Amanakku	Shrub	NA
94	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Boodhikeerai	Climber	NA
95	<i>Ruellia tuberosa</i>	Acanthaceae		Herb	NA
96	<i>Sansevieria roxburghiana</i>	Dracaenaceae	Marun, Mottamamji	Herb	NA
97	<i>Senna auriculata</i>	Caesalpinaceae	Avaram	Shrub	NA
98	<i>Senna occidentalis</i>	Caesalpinaceae	Peiyavarai	Tree	NA
99	<i>Sesamum indicum</i>	Pedaliaceae	Ellu	Herb	NA
100	<i>Sida acuta</i>	Malvaceae	Malaithangi	Herb	NA
101	<i>Sida cordata</i>	Malvaceae	Pazhampaasi	Herb	NA
102	<i>Sida cordifolia</i>	Malvaceae	Nilatutthi	Herb	NA
103	<i>Solanum americanum</i>	Solanaceae	Manatakkali	Herb	NA
104	<i>Solanum melongena</i>	Solanaceae	Kathiri	Herb	NA
105	<i>Solanum torvum</i>	Solanaceae	Chundai	Shrub	NA
106	<i>Solanum trilobatum</i>	Solanaceae	Thoodhuvalai	Climber	NA
107	<i>Solanum virginianum</i>	Solanaceae	Kandankathiri	Herb	NA
108	<i>Spermacoce hispida</i>	Rubiaceae	Nathaichoori	Herb	NA
109	<i>Spermacoce cymoides</i>	Rubiaceae		Herb	NA
110	<i>Tamarindus indica</i>	Caesalpinaceae	Puliyamaram	Tree	NA

111	<i>Tectona grandis</i>	Verbenaceae	Thekku	Tree	NA
112	<i>Tephrosia purpurea</i>	Fabaceae	Kozhinji	Undershrub	NA

Fauna

No rare and endangered faunal species are found in the project area as well as study area. List of fauna in the study area is given in **Chapter 3, Section 3.11.5 & Table 3-21** Observed species comes under least concern as per IUCN status.

Bird Species:

S.No	Scientific Name	Common Name	Family Name	IUCN
1.	<i>Acridotheres fuscus</i>	Jungle Myna	Sturnidae	LC/ IV
2.	<i>Acridotheres tristis</i>	Common Myna	Sturnidae	LC/ IV
3.	<i>Acritillas indica</i>	Yellowbrowed Bulbul	Pycnonotidae	LC/ IV
4.	<i>Anthus trivialis</i>	Tree Pipit	Motacillidae	LC/ IV
5.	<i>Apus affinis</i>	Little Swift	Apodidae	LC/ IV
6.	<i>Athene brama</i>	Spotted owl	Strigidae	LC/ IV
7.	<i>Buteo tesa</i>	White-eyed Buzzard	Accipitridae	LC/ IV
8.	<i>Cacomantis passerinus</i>	Greybellied Cuckoo	Cuculidae	LC/ IV
9.	<i>Chloropsis jerdoni</i>	Jerdon's Leafbird	Chloropseida	LC/ IV
10.	<i>Chrysocolaptes lucidus</i>	Greater Flameback	Picidae	LC/ IV
11.	<i>Chrysommasinense</i>	Yelloweyed Babbler	Timaliidae	LC/ IV
12.	<i>Cinnyris asiaticus</i>	Purple Sunbird	Nectariniidae	LC/ IV
13.	<i>Coracias benghalensis</i>	Indian Roller	Coraciidae	LC/ IV
14.	<i>Coracinamacei</i>	Large Cuckoo shrike	Campephagidae	LC/ IV
15.	<i>Coracinamelanoptera</i>	Blackheaded Cuckoo shrike	Campephagidae	LC/ IV
16.	<i>Corvus culminatus</i>	Indian Jungle Crow	Corvidae	LC/ IV
17.	<i>Corvus splendens</i>	House Crow	Corvidae	LC/ V
18.	<i>Cuculus micropterus</i>	Indian Cuckoo	Cuculidae	LC/ IV
19.	<i>Cyornis tickelliae</i>	Tickell's Blue Flycatcher	Muscicapidae	LC/ IV
20.	<i>Cypsiurus balasiensis</i>	Asian Palm Swift	Apodidae	LC/ IV
21.	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Corvidae	LC/ IV
22.	<i>Dendrocopos mahrattensis</i>	Yellowcrowned Woodpecker	Picidae	LC/ IV
23.	<i>Dendrocopos nanus</i>	Browncapped Pygmy Woodpecker	Picidae	LC/ IV
24.	<i>Dicrurus macrocercus</i>	Black Drongo	Cuculidae	LC/ IV
25.	<i>Elanus caeruleus</i>	Blackwinged Kite	Accipitridae	LC/ IV
26.	<i>Eudynamis scolopaceus</i>	Asian Koel	Cuculidae	LC/ IV
27.	<i>Glaucidium radiatum</i>	Jungle Owl	Strigidae	LC/ IV
28.	<i>Haliastur indus</i>	Brahminy Kite	Accipitridae	LC/ IV
29.	<i>Harpactes fasciatus</i>	Malabar Trogon	Trogonidae	LC/ IV
30.	<i>Iduna aedon</i>	Thickbilled Warbler	Sylviidae	LC/ IV
31.	<i>Irenapueella</i>	Asian Fairybluebird	Irenidae	LC/ IV
32.	<i>Lanius cristatus</i>	Brown Shrike	Laniidae	LC/ IV
33.	<i>Lonchuramalacca</i>	Tricoloured Munia	Estrildidae	LC/ IV
34.	<i>Lonchurapunctulata</i>	Scalybreasted Munia	Estrildidae	LC/ IV

35.	<i>Lonchura striata</i>	Whiterumped Munia	Estrildidae	LC/ IV
36.	<i>Loriculus vernalis</i>	Vernal Hanging Parrot	Psittacidae	LC/ IV
37.	<i>Luscinia svecica</i>	Bluethroat	Muscicapidae	LC/ IV
38.	<i>Megalaima haemacephala</i>	Coppersmith Barbet	Megalaimidae	LC/ IV
39.	<i>Megalaima malabarica</i>	Malabar Barbet	Megalaimidae	LC/ IV
40.	<i>Megalaima viridis</i>	Whitecheeked Barbet	Megalaimidae	LC/ IV
41.	<i>Megalaima zeylanica</i>	Brownheaded Barbet	Megalaimidae	LC/ IV
42.	<i>Merops orientalis</i>	Green Bee-eater	Meropidae	LC/ IV
43.	<i>Merops philippinus</i>	Bluetailed Bee-eater	Meropidae	LC/ IV
44.	<i>Milvus migrans</i>	Black Kite	Accipitridae	LC/ IV
45.	<i>Motacilla cinerea</i>	Grey Wagtail	Muscicapidae	LC/ IV
46.	<i>Muscicapadauaurica</i>	Asian Brown Flycatcher	Muscicapidae	LC/ IV
47.	<i>Myophonus horsfieldii</i>	Malabar Whistling Thrush	Turdidae	LC/ IV
48.	<i>Nisaetus cirrhatius</i>	Crested Hawk Eagle	Accipitridae	LC/ IV
49.	<i>Nyctornis athertoni</i>	Bluebearded Bee-eater	Meropidae	LC/ IV
50.	<i>Orthotomus sutorius</i>	Common Tailorbird	Sylviidae	LC/ IV
51.	<i>Parus aplonotus</i>	Indian Yellow Tit	Paridae	LC/ IV
52.	<i>Passer domesticus</i>	House Sparrow	Passeridae	LC/ IV
53.	<i>Pavocristatus</i>	Indian Peafowl	Phasianidae	LC/ I
54.	<i>Pellorneum ruficeps</i>	Puffthroated Babbler	Timaliidae	LC/ IV
55.	<i>Phylloscopus trochiloides</i>	Greenish Warbler	Sylviidae	LC/ IV
56.	<i>Picumnus innominatus</i>	Speckled Piculet	Picidae	LC/ IV
57.	<i>Pittabrachyura</i>	Indian Pitta	Pittidae	LC/ IV
58.	<i>Ploceus manyar</i>	Streaked Weaver	Ploceidae	LC/ IV
59.	<i>Ploceus philippinus</i>	Baya Weaver	Ploceidae	LC/ IV
60.	<i>Pomatorhinus horsfieldii</i>	Indian Scimitar Babbler	Timaliidae	LC/ IV
61.	<i>Prinia hodgsonii</i>	Greybreasted Prinia	Cisticolidae	LC/ IV
62.	<i>Prinia inornata</i>	Plain Prinia	Cisticolidae	LC/ IV
63.	<i>Prinia socialis</i>	Ashy Prinia	Cisticolidae	LC/ IV
64.	<i>Psittacula columboides</i>	Bluewinged Parakeet	Psittacidae	LC/ IV
65.	<i>Psittacula cyanocephala</i>	Plumheaded Parakeet	Psittacidae	LC/ IV
66.	<i>Psittacula krameri</i>	Roseringed Parakeet	Psittacidae	LC/ IV
67.	<i>Ptyonoprogne concolor</i>	Dusky Crag Martin	Hirundinidae	LC/ IV
68.	<i>Pycnonotus cafer</i>	Redvented Bulbul	Pycnonotidae	LC/ IV
69.	<i>Pycnonotus gularis</i>	Flame-throated Bulbul	Pycnonotidae	LC/ IV
70.	<i>Pycnonotus jocosus</i>	Redwhiskered Bulbul	Pycnonotidae	LC/ IV
71.	<i>Pycnonotus luteolus</i>	Whitebrowed Bulbul	Pycnonotidae	LC/ IV
72.	<i>Rhipidura albobularis</i>	Whitespotted Fantail	Rhipiduridae	LC/ IV
73.	<i>Rhopocichla atriceps</i>	Darkfronted Babbler	Timaliidae	LC/ IV
74.	<i>Saxicolap aprata</i>	Pied Bushchat	Muscicapidae	LC/ IV
75.	<i>Saxicoloides fulicatus</i>	Indian Robin	Muscicapidae	LC/ IV
76.	<i>Sitta frontalis</i>	Velvetfronted Nuthatch	Sittidae	LC/ IV
77.	<i>Spilopelia chinensis</i>	Spotted Dove	Columbidae	LC/ IV
78.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Columbidae	LC/ IV
79.	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	Columbidae	LC/ IV

80.	<i>Tephrodornisgularis</i>	LargeWoodshrike	Tephrodornithid ae	LC/ IV
81.	<i>Tephrodornispondicerianus</i>	CommonWoodshrike	Tephrodornithid ae	LC/ IV
1.	<i>Tephrodornissylvicola</i>	MalabarWoodshrike	Tephrodornithid ae	LC/ IV
2.	<i>Terpsiphoneparadisi</i>	AsianParadiseFlycatcher	Monarchidae	LC/ IV
3.	<i>Treronbicinctus</i>	OrangebreastedGreenpigeon	Columbidae	LC/ IV
4.	<i>Turdoidesstriata</i>	JungleBabbler	Timaliidae	LC/ IV
5.	<i>Turdussimillimus</i>	IndianBlackbird	Turdidae	LC/ IV
6.	<i>Turnixsuscitator</i>	BarredButtonquail	Turnicidae	LC/ IV
7.	<i>Turnixtanki</i>	YellowleggedButtonquail	Turnicidae	LC/ IV
8.	<i>Upupaepops</i>	Hoopoe	Upupidae	LC/ IV
9.	<i>Zootheracitrina</i>	OrangeheadedThrush	Turdidae	LC/ IV

Mammals:

S.No	Species name	Common name	Family	IUCN/WPA
1.	<i>Bandicotabengalensis</i>	LesserBandicootRat	Hystricidae	
2.	<i>Bandicotaindica</i>	GreaterBandicootRat	Hystricidae	LC/IV
3.	<i>Cynopterussphinx</i>	GreaterShort-nosedFruit Bat	Pteropodidae	LC/IV
4.	<i>Felischaus</i>	JungleCat	Felidae	LC/IV
5.	<i>Funambuluspalmarum</i>	Three-stripedPalm Squirrel	Sciuridae	LC/III
6.	<i>Macacamulatta</i>	RhesusMacaque	Cercopithecidae	LC/IV
7.	<i>Musbooduga</i>	LittleIndianFieldMouse	Hystricidae	LC/II
8.	<i>Rattusrattus</i>	HouseRat	Hystricidae	LC/IV
9.	<i>Semnopithecusentellus</i>	CommonLangur	Cercopithecidae	LC/IV
10.	REPTILES			LC/II
11.	<i>Calotesrouxii</i>	Roux'sForestCalotes	Agamidae	
12.	<i>Calotesversicolor</i>	IndianGardenLizard	Agamidae	LC/IV
13.	<i>Eutropiscarinata</i>	Keeled/CommonGrassSkink	Scincidae	LC/IV
14.	<i>Eutropismaularia</i>	BornzeGrassSkink	Scincidae	LC/IV
15.	<i>Hemidactylusbrooki</i>	Brooke'sHouseGecko	Geckonidae	LC/IV
16.	<i>Hemidactylusflaviviridis</i>	HouseGecko	Geckonidae	LC/IV
17.	<i>Hemidactylusfrenatus</i>	AsianHouseGecko	Geckonidae	LC/IV
18.	<i>Hemidactylusleschnaulti</i>	BarkGecko	Geckonidae	LC/IV
19.	<i>Najanaja</i>	SpectacledCobra	Colubridae	LC/IV
20.	<i>Ophiophagushannah</i>	KingCobra	Elapidae	VU/II
21.	<i>Ptyasmucosa</i>	IndianRatSnake	Colubridae	VU/II
22.	<i>Xenochrophispiscator</i>	CheckeredKeelbackWaterSnake	Colubridae	LC/II

Amphibian species:

S.No	Species name	Common name	Family	IUCN
1.	<i>Bufoscaber</i>	Ferguson'sToad	Bufonidae	LC/ IV
2.	<i>Clinotarsuscurtipes</i>	Bi-coloredFrog	Dicroglossidae	LC/ IV
3.	<i>Duttaphrynusmelanostictus</i>	CommonIndianToad	Bufonidae	LC/ IV
4.	<i>Euphlyctiscyanophlyctis</i>	SkitteringFrog	Dicroglossidae	LC/ IV

5.	<i>Euphlyctis hexadactylus</i>	IndiangreenFrog	Dicroglossidae	LC/ IV
6.	<i>Hoplobatrachus crassus</i>	Jerdon'sBullFrog	Dicroglossidae	LC/ IV
7.	<i>Hoplobatrachus tigerinu</i>	IndianbullFrog	Dicroglossidae	LC/ IV
8.	<i>Indiranabrachy tarsus</i>	Short-leggedLeapingfrog	Ranixalidae	LC/ IV
9.	<i>Limnonectes limnocharis</i>	Paddyfield/CricketFrog	Dicroglossidae	LC/ IV
10.	<i>Microhyla ornata</i>	OrnateNarrow-mouthedFrog	Microhylidae	LC/ IV
11.	<i>Sphaerotheca breviceps</i>	IndianBurrowingFrog	Dicroglossidae	LC/ IV
12.	<i>Sphaerotheca carolanda</i>	SouthernBurrowingFrog	Dicroglossidae	LC/ IV

Butterfly species:

S.No	Family	Species name	Common name	Status
1	Nymphalidae	<i>Danaus chrysippus</i>	Plain Tiger	NA
2	Nymphalidae	<i>Danaus genutia</i>	Striped Tiger	NA
3	Nymphalidae	<i>Ariadne merione</i>	Common Caster	NA
4	Nymphalidae	<i>Neptis hylas</i>	Common Sailor	NA
5	Nymphalidae	<i>Phalanta phalantha</i>	Common Leopard	NA
6	Nymphalidae	<i>Melanitis leda</i>	Common Evening Brown	NA
7	Nymphalidae	<i>Mycalesis perseus</i>	Common Bush Brown	NA
8	Nymphalidae	<i>Ypthima asterope</i>	Common Three Ring	NA
9	Nymphalidae	<i>Euthalana is</i>	Baronet	NA
10	Nymphalidae	<i>Argynnis hyperbius</i>	Indian Fritillary	NA
11	Nymphalidae	<i>Byblia lithia</i>	Joker	NA
12	Pieridae	<i>Colotis danae</i>	Crimson Tip	NA
13	Pieridae	<i>Colotis trida</i>	Small Orange Tip	NA
14	Pieridae	<i>Eurema hecabe</i>	Common Grass Yellow	NA
15	Pieridae	<i>Catopsilia pomona</i>	Common Emigrant	NA
16	Pieridae	<i>Cepora nerissa</i>	Common Gull	NA
17	Pieridae	<i>Leptosianina</i>	Psyche	NA
18	Lycaenidae	<i>Castalius rosion</i>	Common Pierrot	NA
19	Lycaenidae	<i>Arhopalaeus centaurus</i>	Large Obakblue	NA
20	Lycaenidae	<i>Euchrysops cnejus</i>	Gram Blue	NA
21	Lycaenidae	<i>Jamides celeno</i>	Common Cerulin	NA
22	Lycaenidae	<i>Freyeria trochylus</i>	Grass Jewel	NA
23	Papilionidae	<i>Papilio polytes</i>	Common Mormon	NA
24	Papilionidae	<i>Papilio demoleus</i>	Lime Butterflies	NA
25	Papilionidae	<i>Atrophaneura aristolochiae</i>	Common Rose	NA
26	Hesperiidae	<i>Borbocinnara</i>	Rice Swift	NA

Socio-Economic Environment

The project is located at Panchapalli & Namandahalli village, Palacode Taluk, Dharmapuri District, Tamil Nadu. The total population in 2011 is 1,585,280; of which male and female are 7,95,110 and 7,90,170 respectively. In education section, total literates in Dharmapuri district are 2195776 of which 7,90,170 are males while 961297 are females. Average literacy rate of

Viluppuram city is 71.88 percent of which male and female literacy was 80.55 and 63.15 percent. The sex ratio of the district was 987, lower than the State sex ratio of 996.

11.7 Anticipated Environmental Impacts

Air Environment

The emissions mainly generated from the mining activities are Blasting, Drilling, Scrapping, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling. Fugitive dust control in mine is shown in **Table 11-1**.

Table 11-1 Fugitive dust control in mine

S. No	Activities	Best practices
1	Drilling	➤ Drills will be provided with dust extractors (dry or wet system)
2	Blasting	➤ Water spray before blasting ➤ Water spray on blasted material prior to transportation ➤ Use of controlled blasting technique
3	Transportation of mined material	➤ Covering of the trucks/dumpers to avoid spillage ➤ Compacted haul road ➤ Speed control on vehicles ➤ Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust

Noise Environment

- Baseline study showed that the noise levels in both Industrial area and in Residential area are slightly exceeded the limit prescribed by CPCB. The designed equipment with noise levels not exceeding beyond the requirements of Occupational Health and Safety Administration Standard will be employed.

Land Use

- The total quarry is over and extent of 16.54.0Ha. at SF. No. 287 (Panchapalli) & 19 (Namadahalli) located in Panchapalli & Namadahalli village, Palacode Taluk, Dharmapuri District, Tamil Nadu State.

Table 11-2 Land Use Pattern of the lease area

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha.)
1	Under quarrying area	2.26.0	13.35.0
2	Waste Dump	3.23.5	2.65.0
3	Infrastructure	0.02.5	0.01.5
4	Village Roads	0.07.0	0.07.0
5	Mine approach road	1.39.0	0.03.5
6	Unutilized	0.12.5	--
7	Green Belt	9.43.5	0.42.0
Total		16.54.0	16.54.0

Wastewater Management

- Sewage (0.45 KLD) will be sent to septic tank followed by soak pit. There is no industrial effluent generation during quarry operation.

Biological Environment

- To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

Solid/ Hazardous Waste Management

- Municipal Solid Wastes including food waste are being disposed to municipal bin.

Environmental Monitoring Program

- A monitoring schedule with respect to Ambient Air Quality, Water & Wastewater Quality, Noise Quality as per Tamil Nadu State Pollution Control Board (TNPCCB), shall be maintained.

11.8 Greenbelt Development

- The green belt plantation programme will be continued till the end of the mining operation in the area. In framing out this programme on a sustainable and scientific base, due consultation and coordination with the forest department will be sought. The plantation will be developed around the mining lease about 0.12.5 Ha, out of 16.54.0Ha. Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

11.9 Disaster Management Plan

The salient features of Disaster Management Plan include

- Emergency shutdown procedure.
- Fire protection system.
- Emergency safety equipment & Reporting and response to emergency.
- Emergency Help from nearby industries and tie up with nearby industries.

11.10 Corporate Environmental Responsibility

- The site has no Relocation and Rehabilitation.
- Most villages have benefited mutually at Thomallur where the mining industry has provided indirect jobs for labor and villages provide accommodation for the labor and staff.
- Supportive industries like food supply and essential shops are economic growth in the villages.

11.11 Benefits of the Proposed Project

- The quarrying activities in this belt will benefit to the local people 30 Nos.
- Improvement in Per Capita Income.
- The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.

- It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses.

12 DISCLOSURE OF CONSULTANTS

In order to assess the potential environmental impacts due to the proposed project at Survey No: 287 (Panchapalli) & 19 (Namandahalli), Panchapalli & Namandahalli Village, Palacode Taluk, Dharmapuri District, Tamil Nadu State to undertake EIA study. The nature of consultancy service rendered covers terrestrial environmental assessment.

12.1 Brief Profile of Hubert Enviro Care Systems (P) Limited (HECS)

Hubert Enviro Care Systems (P) Limited is a leading Environmental Management Company and service provider serving as a catalyst for environmental protection in the industrial & service sectors.

Enviro care Systems was started in 1997 as a proprietor company. In the year 2004, Enviro Care Systems became a Private Limited Company and registered as Hubert Enviro Care Systems (P) Limited.

Across two decades of operation we have developed into a matured corporate house to meet client's requirements to provide products and services of Global standards at the most competitive price within committed schedule of time.

We have full-fledged office and laboratory at Chennai, Mangalore, Trivandrum & Hyderabad.

12.2 Strengths of HECS

Number of Employees

Consultancy	42
Laboratory	100
Projects	29
Operation & Maintenance	999
Total No of Employees	1170

12.3 Quality Policy of HECS



12.4QCI-NABET - EIA Accreditation

Consultancy	Hubert Enviro Care Systems Pvt. Ltd., Chennai
NABET Certificate No	NABET/EIA/2224/SA0190 Valid up to 27/27/2024
MoEF Reg. Lab	F.No. Q-15018/13/2016-CPW


QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality




National Accreditation Board for Education and Training

Certificate of Accreditation

Hubert Enviro Care Systems Pvt. Ltd.,

A-21, (Behind Lions Club School) III Phase, Thiru Vi Ka Industrial Estate, Guindy, Chennai - 600 032.

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3; for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including open cast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation	7	2 (b)	A
6	Metallurgical industries (ferrous & nonferrous)- both primary & secondary	8	3 (a)	B
7	Cement plant	9	3 (b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Pesticides industry and pesticide specific intermediates(excluding formulations)	17	5 (b)	A
10	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	18	5 (c)	A
11	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	20	5 (e)	A
12	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSHC Rules 1989 amended 2000)	28	-	B
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
15	Ports, harbours, break waters and dredging	33	7 (e)	A
16	Highways	34	7 (f)	B
17	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
18	Common municipal solid waste management facility (CMSWMF)	37	7 (i)	B
19	Building and construction projects	38	8 (a)	B
20	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Feb 3, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/23/2696 dated March 6, 2023. The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems Pvt. Ltd, following due process of assessment


Sr. Director, NABET
 Dated: March 6, 2023

Certificate No.
 NABET/EIA/2224/SA 0190

Valid up to
 July 27, 2024

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

Further details may be seen on the following URL: www.hecs.in.